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DIABETES AN IMPORTANT HEALTH PROBLEM

BY CHARLES BOLDUAN, M.D.*

THE reports made to the Department of Health of deaths occurring in this city serve two distinct purposes. In the first place the certificates of death are important legal documents indispensable in the settling of estates, in collecting insurance, and in identifying the particular deceased individual. It is the other purpose, however, which concerns us today, the information obtainable by a proper statistical analysis of the causes of death. This "bookkeeping of health" as it has been termed has been invaluable to health administrators in guiding them in their efforts to control disease.

As we look back over what has been accomplished in the past fifty years we may well be gratified at the marked reduction in the death rate. From a death rate of 29 per 1000 of population in 1881 we have arrived at a rate of less than 11 in 1931. The difference represents an enormous saving of life. Had the rate of 1881 prevailed in this city last year we should have had 203,000 deaths instead of the 77,000 actually recorded. This is a remarkable showing, and credit for the achievement goes to physicians, surgeons, sanitarians, health officials, educators and a host of others.

When we examine our vital statistics we find that the fields in which most of this great progress has been made are limited. A large part of the progress has been due to the reduction of infant mortality, almost all the rest is limited to certain infectious diseases, such as diphtheria, typhoid fever, tuberculosis, and diarrheal disease. Many of the other prominent causes of death show practically no decrease in mortality, and there are some, even, in which there has been a definite increase in mortality. Among the latter, mention may be made of deaths from accidents and deaths from diabetes.

In recent years students of vital statistics have estimated that about twelve years could be added to the expectancy of life at birth through the general application of the medical knowledge now available. In other words no startling medical discovery is needed to make considerable further progress. My study of the situation urges me to call your attention to diabetes as a disease deserving of far greater attention than it has received. Not only is diabetes, to a large extent, preventable, but it is also treated with success. To show what can be accomplished by a well-planned intensive attack on a preventable disease we have only to look at the results of our three years' campaign against diphtheria. For the ten years prior to the campaign, deaths from diphtheria in New York City averaged about 750 per year, 477 being the lowest recorded during that period. In 1930, a year after the beginning of our campaign, there were 199 deaths, and last year only 185. This work was accomplished through the expenditure of approximately $140,000 a year, and we hail the result as a highly profitable investment.

In diabetes we are dealing with a disease which causes approximately 2,000 deaths per annum in this city, and thus far we have taken no steps to organize control measures. The relative importance of diabetes as a cause of death is shown in the following:

DEATHS NEW YORK CITY—1931

Cardio-arterio-renal	27,000	deaths
Pneumonias and influenza	10,200	"
Cancer	8,300	"
All tuberculosis	5,000	"
Accidents (auto 1300)	4,600	"
Diabetes	2,000	"
Acute communicable diseases	900	"
	58,000	
All other causes	20,000	
Total	78,000	

We see here that diabetes causes over double the number of deaths in New York City that do typhoid fever, measles, scarlet fever, diphtheria, whooping cough and cerebrospinal meningitis all combined.

The death rate of diabetes is rising. Following is a table showing the deaths from this disease in New York City and the rate per 100,000 of population.

It will be noted that the death rate from diabetes has risen from 11.4 to 25.6 during the past 30 years. That this increase is not confined to New York City is indicated by the following table compiled by Hoffman, covering 50 American cities. Here, during a period of 19

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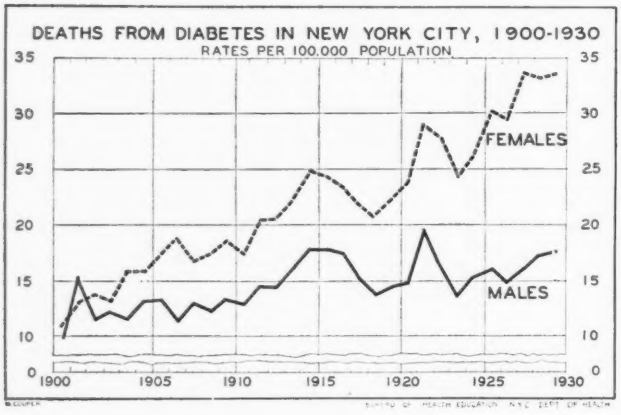
DEATHS FROM DIABETES, NEW YORK CITY, 1898-1930

	Both Sexes		Males		Females	
	Deaths	Rate	Deaths	Rate	Deaths	Rate
1898-1902, inclusive, average	395	11.4	190	11.1	205	11.8
1903-1907, " "	588	14.6	252	12.5	336	16.6
1908-1912, " "	748	15.8	315	13.3	433	18.2
1913	884	17.5	366	14.5	518	20.5
1914	979	19.1	409	16.0	570	22.2
1915	1109	21.2	462	17.8	647	24.8
1916	1119	21.1	470	17.8	649	24.4
1917	1153	21.4	473	17.6	630	23.3
1918	1011	18.4	410	15.0	601	21.9
1919	955	17.1	380	13.7	575	20.6
1920	1075	18.9	411	14.5	664	23.3
1921	1120	19.3	428	14.8	692	23.8
1922	1448	24.4	581	19.6	867	29.1
1923	1360	22.4	512	16.9	848	27.9
1924	1177	19.0	424	13.7	753	24.3
1925	1313	20.8	487	15.4	826	26.2
1926	1485	23.0	517	16.0	968	30.1
1927	1461	22.3	492	14.9	969	29.5
1928	1663	24.8	542	16.1	1121	33.5
1929	1726	25.3	593	17.3	1133	33.2
1930	1784	25.6	615	17.6	1169	33.6



years we see an increase from 15.9 per 100,000 to 21.2.

DIABETES IN 50 AMERICAN CITIES—1912-1930

Year	No. of Cities	Population	Deaths	Per 100,000
1912	50	21,244,714	3,373	15.9
1913	50	21,740,522	3,513	16.2
1914	50	22,235,558	3,825	17.2
1915	50	22,742,510	4,235	18.6
1916	50	23,244,205	4,413	19.0
1917	50	23,752,883	4,419	18.6
1918	50	24,233,579	4,140	17.1
1919	50	24,819,186	4,128	16.6
1920	50	25,330,188	4,625	18.3
1921	50	25,862,147	4,797	18.5
1922	50	26,394,106	5,870	22.2
1923	50	26,926,065	5,536	20.6
1924	50	27,458,024	5,127	18.7
1925	50	27,989,983	5,487	19.6
1926	50	28,521,942	6,182	21.7
1927	50	29,053,901	5,953	20.5
1928	50	29,728,859	6,920	23.3
1929	50	30,117,819	6,911	22.9
1930	50	32,500,340	6,890	21.2

Inasmuch as diabetes is characterized by the reduction in the capacity of the body to utilize sugar, it is natural to inquire whether, perhaps, the increased mortality shown in the preceding tables may not be related to our increasing consumption of sugar. It must be remembered that the use of sugar as such is of relatively recent origin. Two hundred years ago sugar was still a luxury and was very expensive. Honey was the common sweetening agent, and even this was far less extensively used than is sugar now.

To what extent the consumption of sugar has increased in this country may be seen from the following table kindly furnished by the U. S. Bureau of Agricultural Economics. It covers, as you see, approximately sixty years since 1866.

YEARLY PER CAPITA CONSUMPTION OF SUGAR IN THE UNITED STATES

1866-1870	inc.	(average)	32.3 lbs.
1871-1875	"	"	39.9 "
1876-1880	"	"	39.6 "
1881-1885	"	"	47.6 "
1886-1890	"	"	53.3 "
1891-1895	"	"	64.8 "
1896-1900	"	"	64.0 "
1901-1905	"	"	72.5 "
1906-1910	"	"	79.3 "
1911-1915	"	"	85.8 "
1916-1920	"	"	86.4 "
1921-1925	"	"	107.5 "

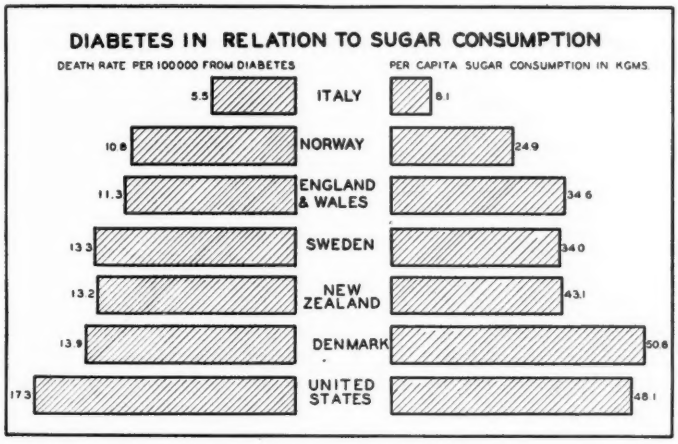
During these sixty years our yearly consumption of sugar has more than trebled, rising from less than 33 pounds per capita to over 107 pounds. In this connection we may study the following graph accompanying a paper by Dr. Henry W. Cook before a convention of the Association of Life Insurance Presidents. This shows on one side the death rate from diabetes in certain countries, and on the other side the yearly per capita consumption of sugar in kilograms. The parallelism is striking.

Students of the problem do not believe that this relation is necessarily the direct one which

would imply an overtaxing of the pancreas with sugar. They lean rather to the idea that this increased consumption of sugar is part of a common tendency to overeating, a practice of particular significance in view of the lack of sufficient muscular exercise which the automobile has brought with it. Joslin finds that obesity is one of the common forerunners of diabetes and he emphasizes the prevention of obesity as an important item in any effort to control diabetes.

AVERAGE YEARLY DIABETES DEATHS, NEW YORK CITY 1929-30-31, BY AGE GROUPS

Age Group	Deaths M.	Deaths F.	Deaths Together	Per 100,000 of the Group M.	Per 100,000 of the Group F.	Per 100,000 of the Group Together
Under 25	14	16	30	0.95	1.07	1.01
25-44	45	71	116	3.57	5.80	4.67
45-64	310	620	930	50.79	105.22	77.53
65 and over	244	490	734	200.70	342.75	277.46
	613	1197	1810	17.65	34.62	26.14



The rôle of overeating is well brought out by the following table showing the influence of the food blockade on diabetes mortality in Germany during the War.

EFFECT OF RESTRICTION OF FOOD UPON DIABETES MORTALITY (JOSLIN)

	Berlin Deaths	Munich Deaths	Breslau Deaths
1913	409	105	100
14	467	104	115
15	383	101	113
16	331	82	78
17	246	73	72
18	204	77	51
19	185		
20	178		

From the standpoint of social economy the importance of any disease depends, to a large extent, on the age group affected. We have, unfortunately, no comprehensive statistics of the age distribution of cases of the disease. However, the following table showing the age distribution of the deaths from diabetes in New York City will suffice to show the ages chiefly affected.

We see here that the greatest toll of lives is taken by diabetes in the higher age groups, especially in those over 45 years of age. In those under 25, there is only one death per 100,000 of population, and even in the group from 25 to 44 inclusive the rate is less than 5 per 100,000. Thereafter the mortality rate rises rapidly, being over 77 in the group 45-64, and over 277 in those past 65.

The table brings out another striking fact, namely, that the diabetes death rate among females is double that of the males. Although the difference is less in the lower age groups, it is there, and in the group 45-64 the rate among females is more than twice that among males.

I have analyzed the diabetes deaths in the city during 1931 by civil conditions and present the following table:

DIABETES DEATHS, NEW YORK CITY, 1931

Age Groups	Total M.	Total F.	Single M.	Single F.	Married M.	Married F.	Widowed M.	Widowed F.	Divorced M.	Divorced F.	Unknown M.	Unknown F.
Under 15 years	7	4	7	4	.....	.....	.....	.....	.....	.....	.....	.....
15-24 years	5	15	5	9	.....	4	.....	1	.....	.....	.....	1
25-34 years	11	15	6	2	5	12	.....	1	.....	.....	.....	.....
35-44 years	32	52	4	4	27	41	1	7	.....	.....	.....	.....
45-54 years	99	250	17	23	77	174	4	53	1	.....	.....	.....
55-64 years	217	440	21	19	157	225	37	195	1	.....	1	1
65 years and over	262	512	18	18	164	164	80	327	.....	3	.....	.....
Total	633	1288	78	79	430	620	122	584	2	3	1	2

We note, both in the total deaths and among the married and widowed that the deaths among females are about double those among males. But among single persons no such difference is apparent. Does this indicate that unmarried women are less prone to overeat than are their married or widowed sisters? The point seems worth studying.

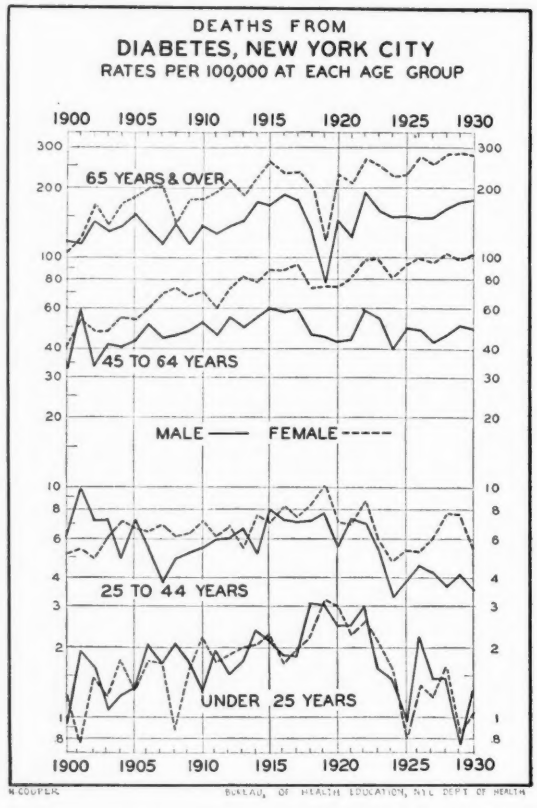
The following table shows the time of onset of the disease. It relates to 5086 cases of true diabetes observed by Joslin to April, 1927. The time of onset is shown by decennia.

ONSET OF 5086 CASES OF DIABETES (JOSLIN)

First Decennium	2	3	4	5	6	7	8	All Ages
46	70	88	130	249	263	128	26	1,000

It is interesting to compare this table with the following, which shows the age at death of 5431 fatal cases in New York City during the past three years.

The picture gained from this comparison is very encouraging, for it shows that while over 11 per cent of Joslin's cases had an onset during the first two decennia, in New York City during the past three years less than 2 per cent of the diabetes deaths occurred before the age of 25. In fact only 8 per cent of the deaths occurred before age 45.


DEATHS FROM
DIABETES, NEW YORK CITY
RATES PER 100,000 AT EACH AGE GROUP
1900 1905 1910 1915 1920 1925 1930
65 YEARS & OVER
45 TO 64 YEARS
MALE —— FEMALE -----
25 TO 44 YEARS
UNDER 25 YEARS
1900 1905 1910 1915 1920 1925 1930
N COOPER
BUREAU OF HEALTH EDUCATION, NYC DEPT OF HEALTH

AGE AT DEATH IN DIABETES—NEW YORK CITY—1929-31 INCL.

	Under 15	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85-	Total
Males	23	19	33	102	320	612	556	161	15	1841
per 1000	13	10	18	55	174	333	302	87	8	1000
Females	14	34	46	166	605	1255	1142	297	31	3590
per 1000	4	10	13	46	168	350	318	82	9	1000
Both Sexes	37	53	79	268	925	1867	1698	458	46	5431
per 1000	7	10	14	49	170	344	313	84	9	1000

With the work of Allen and especially with the discovery of insulin by Banting and Best a marked advance was made in the management of diabetes. The experience of all physicians who treat large numbers of diabetics indicates that a considerable proportion of the patients now live out a normal expectancy of life. The diabetes, to be sure, is not cured, but the patients eventually die of some other disease. Under the circumstances one would expect to find this reflected in the course of the death rate. Let us examine the following graph which shows the course of the death rate in New York City for males and for females, by age groups during the past 30 years.

We observe here a definite decline in the death rate for both sexes in the youngest age group. In the group 25-44 the decline appears to be limited to males. In both the higher age groups no decline is seen; in fact among females these groups show a marked rise in the death rate.

In view of what clinical experience has shown as to the effectiveness of modern treatment of diabetes, it seems to me that this analysis points to an increasing prevalence of diabetes, and that this is sufficiently great to overbalance the benefit which has resulted from improved treatment.

Unfortunately we have no way of determining the prevalence of diabetes. We have mortality figures but none relating to morbidity. This is a serious defect, not merely because of the statistical basis thus lacking, but especially because of the value such morbidity reports would have in any organized efforts to control diabetes.

Some time ago the Massachusetts State Department of Health made an investigation of the prevalence of various chronic diseases, including diabetes. House to house visits were made and a considerable proportion of the population of the State was thus "sampled". On the basis of this investigation it was concluded that there were now some 14,000 diabetics in that state. On the basis of the Massachusetts rate, and bearing in mind the large Jewish pop-

ulation in New York City, we may estimate that there are about 25,000 diabetics in New York City at the present time. However, this is only a very crude estimate; no trustworthy figures are available. In his recently published handbook for the Jewish diabetic, Coller, of Brooklyn, gives an estimate of 100,000 diabetics in New York City. This number, however, appears to be excessive.

One may attempt to estimate the total number of cases of diabetes from the deaths registered during a year. For this purpose one needs to know something about the case fatality. With a chronic disease like diabetes this can be determined only approximately. I find for example that Joslin reports 83 cases treated with insulin and observed over a period of 5½ years beginning in 1922. Of this group 32 were fatal and 51 were still alive at the time of report. The 32 deaths occurred at the rate of about six a year, an annual case fatality of approximately 1 in 14. Should this rate be applied to the 2,000 deaths in New York City it would indicate some 28,000 cases in the city at the present time, and perhaps half a million cases in the United States as a whole. Joslin estimates the number of cases in the United States as perhaps one million and the basis for his estimate appears reasonable. He points out that with modern methods of treatment the average duration of life from the onset of diabetes has increased considerably. Ever since the introduction of insulin treatment there has been considerable improvement, so that the results obtained now are distinctly better than they were during the first five years of the insulin era.

In any event, the disease is very prevalent, and with approximately 2,000 deaths a year in New York City, it constitutes an important health problem. For comparison I may cite pulmonary tuberculosis, with some 4500 deaths a year, and with approximately 20,000 known cases in this city. For years we have had a well-organized program for the control of tuberculosis; we have many special clinics, sanatoria, hospitals and preventoria; we have diagnostic facilities, both bacteriological and clinical; we make extensive efforts to promote a better public understanding of the disease. In diabetes health departments have done almost nothing.

It is very instructive to analyze the causes of death in those who have diabetes. Such an analysis reveals that there has been a considerable reduction in the proportion of deaths due to diabetic coma. This reduction is due to the improved methods of treatment. An excellent presentation of the situation is given in the following table abstracted from one given by Joslin and covering his experience from 1894 to 1926:

CAUSES OF DEATHS IN DIABETES—JOSLIN'S CASES 1894-1926

	Naunym Era		Allen Era		Insulin Era	
	1894-June, 1914		June, 1914-Aug., 1922		Aug., 1922-July, 1926	
Total deaths	342		805		609	
Coma present	208	60.8%	338	42%	122	20%
Cardio-reno-vascular	45	13.1	166	20.6	207	34
Infections	29	8.5	145	18.0	163	26.8
Tuberculosis	16	4.7	37	4.6	32	5.3
Cancer	9	2.6	27	3.4	30	4.9
Inanition	1	0.3	18	2.2	2	0.3
Miscellaneous	34	10	74	9.2	53	8.7

An analysis of 1784 deaths in diabetics in New York City in 1930 shows the following contributory causes of death.

DIABETES DEATHS, NEW YORK CITY, 1930, BY CONTRIBUTORY CAUSE

Total Diabetes Deaths			1784	100%
No contributory cause (mostly coma?)			412	23%
Dis. of cardio-arterio-renal system			932	52%
Gangrene	119			
Pneumonias and other respiratory	138			
Septic infections, boils, etc.	55			
Biliary and liver	13			
Appendicitis	4			
		Total infections (Excl. of Tbc.)	329	18%
Tuberculosis	5			
Surgical operations	7			
Miscellaneous	99			
		All others	111	7%
			1784	

This table, too, brings out the important part played by pathological changes in the cardio-arterio-renal system by gangrene and by septic infections.

If we add together the deaths listed under gangrene, the various septic infections, the liver and biliary conditions, appendicitis and surgical operations, we have a total of 198 deaths in which proper surgical care was of the highest importance. This undoubtedly underestimates the part which the surgeon plays in diabetes, for it is based on fatal cases. Joslin's experience indicates that at the present time every other diabetic becomes a case for surgical treatment some time during the course of his or her disease. In any plan, therefore, for the control of diabetes the rôle of the surgeon must not be overlooked. Proper surgical treatment can help us considerably in reducing the mortality in diabetic individuals.

So far as the deaths listed only as diabetes are concerned, it is likely that a large proportion of these were due to coma. The percentage, it will be noticed (23%), is not much higher

than that recorded by Joslin (20%) for his fatal cases from 1922 to July 1, 1926. It is well to note, however, that Joslin traced 1241 cases out of 1329 cases treated from July 1, 1926 to July 1, 1927 and among this number found not a single death from coma. This indicates another point where progress in the control of diabetes can be made.

From the data presented I hope it will be clear that a concerted effort should be made to control diabetes. The field holds out definite promise of yielding valuable results. Without attempting to formulate a program to be followed, let me give you a quotation from Joslin:

"The number of cases is so great that it at once becomes evident that their care must rest in the hands of the general practitioner. It is ridiculous to expect that the treatment of diabetics should be under the supervision of a specialist; neither can they all undergo hospital treatment. It is plain that a program of education not only for the diabetic patients themselves but the population as a whole must be instituted along similar lines to that which has been adopted in the treatment of tuberculosis. But first of all this program must begin with the doctor. The campaign against tuberculosis has given the community fresh air. A campaign for the prevention and treatment of diabetes should give the community a knowledge of diet, of the danger of obesity, and of the importance of physical exercise. The gain to the community from the dissemination of such knowledge will almost offset the harm caused by diabetes. In this campaign I would especially emphasize the importance of the education of the general practitioner in diabetes. To treat the 1,000,000 or more diabetic patients in the United States there were, in 1925, 147,010 physicians. Formerly a physician would rarely see over 5 to 10 diabetics a year, but with the increased frequency of the disease in the future he is destined to see still more. Between 1898 and 1914, my own Naunym Epoch, the average duration of life of my 331 fatal cases was 4.8 years; between August, 1922, and July, 1926, for 600 fatal cases it was 7.7 years or an increase of 2.9 years. Consider what this change in duration means when applied to the 1,000,000 diabetic patients in the United States. It creates an addition of nearly three million years of the disease diabetes which the general practitioner must treat. Furthermore, these additional years of illness for each patient with diabetes require far more treatment, and more resourceful treatment, than the earlier years. The type of diabetes one sees today is very different from what it was before the World War. This increase in the duration of life of diabetics is based upon my own experience, but I believe a similar relative change in duration of the disease will hold for the entire country. How much greater the increase in duration of life is destined to be through insulin no one can predict."

What may we hope to accomplish by organizing a program for the control of diabetes?

We now average about 2,000 deaths of diabetics a year. Of these we may assume 20 per cent die in coma. Surely the greater part of these deaths should be prevented, once we can reach all diabetic patients with our educational measures. The 200 deaths now caused by septic infections, boils, gangrene, etc., fall in this same category.

At present it does not seem likely that we can effect any marked reduction in the deaths in diabetics due to the disease of the cardio-arterio-renal system. In the population of the city as a whole the mortality due to this cause has remained practically stationary during the past thirty years. Similarly there appears little prospect of materially reducing the deaths due to pneumonia. The possibilities of control measures are thus limited chiefly to perhaps 40 per cent of the diabetes deaths, but this is now a group of some 800 deaths on which we may hope to make an impression.

It seems reasonable to believe that within the next five years we ought to be able to reduce the deaths from diabetes by at least 20 per cent. On the basis of the present number of deaths this would represent a saving of 400 lives a year, an achievement which would outrank our excellent showing against diphtheria.

At any rate let us attack diabetes as a health problem.

THE NATURE OF THE EXTRINSIC FACTOR OF THE DEFICIENCY STATE IN PERNICIOUS ANEMIA AND IN RELATED MACROCYTIC ANEMIAS*

Activation of Yeast Derivatives With Normal Human Gastric Juice

BY MAURICE B. STRAUSS, M.D.† AND WILLIAM B. CASTLE, M.D.†

INTRODUCTION

EXPERIMENTS have previously been reported which in our opinion demonstrate that Addisonian pernicious anemia is a deficiency disease conditioned by the lack of a specific intrinsic factor, present in normal human gastric juice and absent in that of cases of pernicious anemia[1, 2, 3, 4, 5]. In the normal individual the function of this intrinsic factor of the gastric juice is to interact with an extrinsic factor in the food to produce specific hematopoietic effects (demonstrable in pernicious anemia). The interaction of these two factors may, therefore, be regarded as preventive of the development of pernicious anemia in the normal individual. Conversely, the failure of this reaction to take place may be expected to lead to the development of pernicious anemia. Thus, all the patients with Addisonian pernicious anemia in relapse, whom we have so far examined, have shown an inability to carry out this essential reaction.

The intrinsic factor of the normal gastric juice has been defined by us as a heat-labile substance, not corresponding in its properties to hydrochloric acid, pepsin, rennin or lipase. The extrinsic factor of the food has been found in the washed proteins of beef muscle precipitated at pH 6, but not in washed casein or wheat gluten, the former of which is a relatively complete protein. We have tentatively described the extrinsic factor as being "protein or a closely related substance". The observations set forth in this paper modify our former idea of the nature of the extrinsic factor and in so doing demonstrate certain significant etiological relationships between Addisonian pernicious anemia and other macrocytic anemias responding to liver extract.

OBSERVATIONS

The following observations were all conducted upon patients with classical Addisonian pernicious anemia, placed upon diets containing no meat, liver or kidneys. The control observations on the ineffectiveness of normal human gastric juice alone, on the conditions essential to the production of hematopoietic substances effective in pernicious anemia with mixtures of gastric juice and beef muscle, and on the expected blood responses to the daily oral administration of such mixtures have been presented at length in our former papers. The conditions and methods of those observations have been carefully duplicated in the present series of cases.

During periods of daily administration of test preparations the absence of a significant increase of reticulocytes within 10 days was regarded as evidence of a lack of hematopoietic effect, while an appropriate increase within 10 days was considered as a positive result. The use of the reticulocyte phenomenon in pernicious anemia has been fully discussed by Minot and his associates[6], and we have already demonstrated its applicability to this particular problem[2, 3]. In Table 1 are shown the results in 14 patients of 17 observations with various substances either administered alone or after incubation with normal human gastric juice. The data are given for alternate days only during the administration of test preparations. With a few exceptions, no attempt is made to represent the changes of red blood cells and hemoglobin beyond the actual periods of test administration, since reticulocyte responses in cases with less than three million red blood cells per cu. mm. give in the space of a few days far more definite information.

Neither casein nor wheat gluten contains any of the group of proteins included under the class of nucleo-proteins, and these were ineffective with gastric juice (Cases 19 and 27); whereas beef muscle does contain nucleo-proteins and has been repeatedly shown to be effective in pernicious anemia after incubation with normal human gastric juice[3, 4]. For this reason experiments were undertaken to determine, if possible, whether the nucleo-proteins constituted the substrate (extrinsic factor) with which normal human gastric juice interacted to form the hematopoietic substance. As beef spleen is a rich source of nucleo-protein, and has definitely been proved inert by itself in the treatment of pernicious anemia[3], 200 grams of this organ were digested with 150 c.c. of normal human gastric juice and administered daily to Case 50. Fifty grams of spleen pulp after incubation with 50 c.c. of gastric juice

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We desire to acknowledge with thanks the kind coöperation of Dr. James H. Means and Dr. Wyman Richardson of the Massachusetts General Hospital, of Dr. Hermann Blumgart of the Beth Israel Hospital, Boston, Mass., and of Dr. Herman A. Lawson of the Rhode Island Hospital, Providence, R. I. We are greatly indebted to Miss Margaret Evans, Miss Charlotte Nicklin, and Miss Florence Kelley for their work in performing the blood examinations.

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were given daily to a second patient, Case 51. As shown in Table 1, maximum reticulocyte responses occurred in both instances. Since in Case 51 the effect of 50 gm. of spleen incubated with normal human gastric juice was equivalent to at least that of 200 grams of beef muscle similarly digested as shown by our previous observations, these results suggested the correctness of the hypothesis that nuclear material was the substrate acted upon by gastric juice to produce a hematopoietic substance. However, when these experiments were repeated several months later upon Cases 52, 53, and 54, entirely negative results were obtained. Since no variations in the technique of these experiments were apparent, these clearly divergent results at once suggested that the essential material in spleen pulp acted upon by gastric juice was not the nuclear material which is present in more or less constant quantity, but rather some variable factor.

It is known that the vitamin content of animal tissues varies at different times of the year and as a result of differences in diet. The absence of fat from the washed proteins of beef muscle which reacted with the gastric juice to form a hematopoietic substance definitely precluded the possibility of fat soluble vitamins being involved; and since the repeatedly washed proteins of beef muscle retained the material, it seemed unlikely that any of the water soluble vitamins were involved. However, it was subsequently learned that the proteins remaining after meat extract has been made (by a process similar to the one employed by us) are rich in the B_2 vitamin[7].

In the meantime, certain suggestive observations were made in other types of macrocytic anemia. Wills[8] reported the cure of cases of tropical macrocytic anemia, similar to Addisonian pernicious anemia but usually with normal acidity of the gastric contents, by the administration of autolyzed yeast (rich in the B_2 vitamin). Vaughan and Hunter[9] have done the same for cases of celiac disease with macrocytic anemia and normally acid gastric contents, and recently one of us[10] has obtained responses with autolyzed yeast in certain cases of sprue with macrocytic anemia. Finally, Walden and Clowes[11] have recently reported a marked increase of the potency of liver extract No. 343 (N. N. R.), known to contain vitamin B_2, after incubation with fresh hog stomach, a source of intrinsic factor. On the other hand, Cohn, Minot, Alles and Salter[12] in 1928 reported essentially negative results in the treatment of Addisonian pernicious anemia with the feeding of 120 gm. of yeast cake daily and with various concentrates of vitamin B. That autolyzed yeast is ineffective in Addisonian pernicious anemia has recently been conclusively demonstrated by Davidson[13].

Since, then, autolyzed yeast produced remissions in cases of macrocytic anemia with apparently normal gastric contents and *not* in classical cases of Addisonian pernicious anemia with achylia gastrica, and since all materials thus far found to be rendered effective by the action of gastric juice contained vitamin B_2, it seemed logical to suppose that the hematopoietic substance might be produced by the interaction of normal human gastric juice and vitamin B_2. In a recent conversation Dr. Randolph West of New York pointed out as a possibly relevant fact that the purest effective extracts of liver which he has been able to produce contain vitamin B_2. On the basis of experience with sprue in Porto Rico and of certain animal experiments, Dr. C. P. Rhoads of the Rockefeller Hospital also encouraged us in our proposal to try the effect upon pernicious anemia of a substance rich in vitamin B_2 after incubation with normal human gastric juice.

Accordingly, a patient with classical Addisonian pernicious anemia (Case 55) was given daily 12 gm. of an autolyzed yeast preparation* for 10 days. No effect upon blood formation was noted. The same amount of autolyzed yeast was then administered daily with 150 cc. of normal human gastric juice. Upon the tenth day the reticulocytes reached a peak of 25 per cent and in four weeks there was a rise of over two million red blood cells per cu. mm.

This result then, resembles our extensive observations with beef muscle, in that autolyzed yeast alone was inert in pernicious anemia, but was capable of interacting with normal human gastric juice to form a substance producing a remission.

Autolyzed yeast is rich in both vitamin B_1 and B_2 as well as in proteins and nucleo-proteins. It has been well-established that vitamin B_1 can be completely destroyed by autoclaving at 15 lbs. pressure for five hours. This process also destroys at least half of the vitamin B_2. Accordingly, to rule out a possible interaction between vitamin B_1 and gastric juice as being responsible for the results obtained in Case 55, the next patient, Case 56, was given daily a mixture of 24 gm. of autolyzed yeast, which had been autoclaved for five hours to destroy all the vitamin B_1, and 150 cc. of normal human gastric juice. A prompt and characteristic reticulocyte response followed.

It was next considered necessary to rule out the protein and nucleo-protein material of the autolyzed yeast. Accordingly, an 80 per cent alcohol extract of the autolyzed yeast was prepared and concentrated to a paste in vacuo at a temperature of 60°C. This material was found to contain 5.8 per cent of proteins and only 0.38 per cent nucleo-protein. Case 57, after a preliminary negative control period of 10 days during which time autolyzed yeast alone was administered, received daily 12 gm. of concentrated alcoholic extract together with

*Vegex: made from fresh washed brewers' yeast by autolysis with salt solution.

TABLE 1.—ANALYSIS OF EXTRINSIC FACTOR OF SPECIFIC REACTION WITH NORMAL HUMAN GASTRIC JUICE RESULTING IN HEMATOPOIESIS IN PERNICIOUS ANEMIA

First Periods.

Daily administration of various substances as indicated below.

Days of treatment	Casein 50 gm. + gastric juice		Gluten 50 gm. + gastric juice		Spleen pulp 200 gm. + gastric juice		Spleen pulp 50 gm. + gastric juice		Spleen pulp 100 gm. + gastric juice		Spleen pulp 50 gm. + gastric juice		Washed Spleen pulp 125 gm. + gastric juice		Autolyzed yeast 12 gm.		Autoclaved yeast 24 gm. + gastric juice		Autolyzed yeast 12 gm.		Nucleo protein 5 gm. + gastric juice		Nucleo protein 5 gm. + gastric juice	
	Case 19.		Case 27.		Case 50.		Case 51.		Case 52.		Case 53.		Case 54.		Case 55.		Case 56.		Case 57.		Case 51a.*		Case 58.	
	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C mils.	Ret. %	R.B.C. mils.	Ret. %
0 . .	0.70	5.0	1.33	1.8	1.38	0.2	1.03	3.8	2.01	0.6	1.34	2.6	1.29	1.4	1.40	0.6	2.02	0.8	1.71	1.0	2.00	2.5	1.27	1.0
2 . .	0.74	2.8	1.46	1.6	1.56	0.4	0.88	2.2	1.89	0.2	1.12	1.8	1.31	0.2	1.39	1.2	1.70	1.0	1.80	1.0	2.09	3.0	1.42	0.2
4 . .	0.75	3.1	1.13	1.4	1.64	0.4	1.09	9.2	2.15	0.4	1.29	0.4	0.96	0.6	1.16	0.8	1.58	2.8	1.35	1.6	2.07	6.8	1.14	1.4
6 . .	0.77	1.6	1.21	1.3	1.47	2.4	0.91	17.6	1.67	0.6	1.36	0.6	1.19	0.8	1.34	1.2	1.85	6.2	1.51	1.0	2.64	**8.0**	1.12	1.2
8 . .	0.76	1.4	1.16	1.2	1.26	8.0	1.43	**20.8**	2.10	0.4	0.93	1.0	1.26	1.4	1.38	3.0	1.59	**10.2**	1.62	3.0	2.51	5.4	1.24	1.8
10 . .	..	..	1.28	1.8	1.83	**20.6**	1.63	6.0	1.95	0.2	..	..	..	..	1.36	1.6	2.09	7.8	1.74	2.8	2.71	1.0	1.07	1.9

Second Periods.

Daily administration of various substances as indicated below.

	Beef muscle 200 gm. + gastric juice		Washed beef muscle proteins + gastric juice		No therapy		No therapy		L. E. 343 N. N. R. derived from 300 gm.		L. E. 343 N. N. R. derived from 1600 gm. for 2 days		L. E. 343 N. N. R. derived from 1600 gm. for 2 days		Autolyzed yeast 12 gm. + gastric juice			Alcohol yeast extract 12 gm. + gastric juice		Liver 200 gm. raw pulp		Filtrate of Spleen digest + gastric juice	
2 . .	0.74	1.8	1.01	1.6	1.81	13.4	1.83	3.4	1.90	0.2	0.93	1.0	1.38	0.6	1.46	0.6	..	..	1.71	2.0	2.71	1.4	1.40	1.2
4 . .	0.82	4.4	0.97	3.2	1.62	2.4	1.97	2.6	1.90	0.2	..	..	..	..	1.26	1.8	..	..	1.64	5.6	2.46	1.2	1.12	1.0
6 . .	0.80	9.3	0.95	4.3	2.34	0.2	2.30	2.4	1.90	5.6	1.27	**13.0**	1.19	8.8	1.37	3.0	..	..	1.52	10.0	2.58	0.6	0.95	1.4
8 . .	1.22	18.4	0.74	6.2	..	..	..	..	2.12	8.6	1.27	6.8	1.35	**28.8**	1.44	14.2	..	..	1.81	11.8	2.55	2.6	1.10	3.2
10 . .	1.22	**30.2**	0.91	**11.4**	..	..	..	..	2.87	**12.0**	1.34	5.2	..	..	1.65	**25.0**	..	..	2.30	**21.0**	2.78	**4.0**	1.17	3.0
12 . .	1.71	12.2	..	10.8	..	..	..	..	..	..	..	..	..	..	1.94	10.8	..	..	..	..	..	..	1.53	**6.6**

*Subsequent observation on Case 51.
†Subsequent observation on Case 59.
‡Patient subsequently responded to liver.

EXTRINSIC FACTOR OF SPECIFIC REACTION
UMAN GASTRIC JUICE RESULTING IN
OIESIS IN PERNICIOUS ANEMIA

First Periods.

of various substances as indicated below.

zed st m.		Autoclaved yeast 24 gm. + gastric juice		Autolyzed yeast 12 gm.		Nucleo protein 5 gm. + gastric juice		Nucleo protein 5 gm. + gastric juice		gast
55.		Case 56.		Case 57.		Case 51a.*		Case 58.		C
Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C mils.	
0.6	2.02	0.8	1.71	1.0	2.00	2.5	1.27	1.0	1.4	
1.2	1.70	1.0	1.80	1.0	2.09	3.0	1.42	0.2	1.5	
0.8	1.58	2.8	1.35	1.6	2.07	6.8	1.14	1.4	1.3	
1.2	1.85	6.2	1.51	1.0	2.64	**8.0**	1.12	1.2	1.6	
3.0	1.59	**10.2**	1.62	3.0	2.51	5.4	1.24	1.8	1.5	
1.6	2.09	7.8	1.74	2.8	2.71	1.0	1.07	1.9	1.3	

Second Periods.

of various substances as indicated below.

zed . uice			Alcohol yeast extract 12 gm. + gastric juice		Liver 200 gm. raw pulp		Filtrate of Spleen digest + gastric juice		L. N deri 3
0.6	..	..	1.71	2.0	2.71	1.4	1.40	1.2	1.3
1.8	..	..	1.64	5.6	2.46	1.2	1.12	1.0	1.2
3.0	..	..	1.52	10.0	2.58	0.6	0.95	1.4	1.1
4.2	..	..	1.81	11.8	2.55	2.6	1.10	3.2	1.1
5.0	..	..	2.30	**21.0**	2.78	**4.0**	1.17	3.0	1.2
0.8	..	..	..	..	..	..	1.53	**6.6**	1.4

eo in uice	Nucleo protein 5 gm. + gastric juice		Animal Nucleic Acid 5 gm.		Yeast Nucleic Acid 10 gm. + gastric juice		Yeast Nucleic Acid 10 gm. + gastric juice		Yeast Nucleic Acid 10 gm. + gastric juice	
8.	Case 59.		Case 51b.*		Case 59a.†		Case 60.		Case 61.	
Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret. %	R.B.C. mils.	Ret %
1.0	1.46	0.4	1.61	0.4	1.50	0.2	1.15	3.2	2.11	3.6
0.2	1.55	0.4	1.86	0.8	1.93	0.4	1.12	6.2	2.10	1.8
1.4	1.32	0.4	1.96	1.0	1.68	0.4	1.23	5.8	1.99	2.0
1.2	1.62	0.6	2.07	1.4	1.46	0.4	1.18	7.2	2.16	1.6
1.8	1.53	0.1	1.75	1.0	1.46	0.2	1.23	7.0	2.10	0.8
1.9	1.30	0.6	..	..	..	..	1.21	4.8	2.23	1.0

te en t uice	L. E. 343 N. N. R. derived from 300 gm.		Animal Nucleic Acid 5 gm. + gastric juice		L. E. 343 N. N. R. derived from 300 gm.		L. E. 343 N. N. R. derived from 300 gm.		L. E. 343 N. N. R. derived from 600 gm.	
1.2	1.32	0.6	1.83	0.4	1.32	0.6	1.03	5.2	1.88	2.0
1.0	1.21	1.6	1.98	0.8	1.21	1.6	0.81	15.6	1.90	1.8
1.4	1.10	4.6	1.64	0.8	1.10	4.6	0.97	26.4	1.89	6.0
3.2	1.15	6.0	1.82	0.8	1.15	6.0	1.61	**29.6**	1.80	**14.0**
3.0	1.21	6.2	1.46	1.0	1.21	6.2	1.93	10.6	1.88	12.6
6.6	1.45	**9.0**	..	‡	1.45	**9.0**	1.81	7.8	..	..

150 cc. of normal human gastric juice. A maximal remission occurred.

To further study the possible rôle of nucleoprotein as a substrate for these reactions with normal gastric juice, nucleo-protein was prepared from freshly collected hens' blood according to the technique of Ackermann[14]. Cases 51a, 58 and 59 each received this material daily for 10 days together with normal gastric juice. A distinct reticulocyte response occurred in Case 51a and no response in Cases 58 and 59. In the last two cases the material was carefully washed with alcohol, and vitamin B_2, which may have been present with the nucleo-protein, may well have been removed.

These observations then suggest that neither ordinary proteins nor nucleo-proteins may serve as the substrate for the interaction with gastric juice. However, there is reason to believe that nucleic acid as well as vitamin B_2 is present in the alcoholic extract of autolyzed yeast. One patient, Case 51b, was, therefore, given daily for ten days animal nucleic acid (prepared from beef spleen pulp) after incubation with normal human gastric juice. No effect upon blood formation was observed. Three patients, Cases 59a, 60, and 61 were then given daily for 10 days yeast nucleic acid after incubation with normal human gastric juice with no effect upon blood formation. Thus the observations so far made demonstrate that only those substances containing vitamin B_2, whether from animal or plant sources, may serve as the extrinsic factor of the reaction with normal human gastric juice.

DISCUSSION

The experiments reported at this time serve to throw further light upon the nature of the extrinsic factor which upon interaction with normal human gastric juice has a hematopoietic effect in pernicious anemia. It is clearly demonstrated that this substance is *not* present in washed casein, in wheat gluten, in washed nucleo-protein from hens' blood, in animal nucleic acid or in yeast nucleic acid. It is, on the other hand, present in beef muscle proteins freed of fat, carbohydrate and fat soluble materials; in autolyzed yeast it is present in approximately 20 times the concentration that it is found in beef muscle. It is not destroyed by autoclaving for five hours at 15 lbs. pressure (which destroys vitamin B_1) and it is separable from the proteins of yeast by 80 per cent alcohol extraction. It is found in beef spleens at times, but at others it is absent or present in amounts too small to produce demonstrable effect.

In general, then, the characteristics and distribution of the extrinsic factor correspond to those of vitamin B_2. Since, however, the composition of vitamin B_2 is not known and since there is no source of vitamin B_2 which is not a mixture of different substances, any attempt at the positive and unequivocal demonstration of the identity of the extrinsic factor as vitamin B_2 is bound to be subject to serious limitations. Experiments are in progress at present with various sources of vitamin B_2 which may serve to throw light upon the problem. However, the observations reported here must raise the question as to whether results obtained when vitamin B_2 is administered orally both to animals and to patients (as in pellagra) are due in reality to the vitamin B_2 itself or to the product of interaction of the gastric juice with the vitamin. If it is possible clearly to demonstrate that a single potent vitamin B_2 preparation is incapable of reacting with normal human gastric juice to form the substance producing remission in pernicious anemia, there need be no further attempts to demonstrate the identity of vitamin B_2 as the substrate of the reaction with gastric juice. Until such time, however, the possibility that vitamin B_2 is the substance which interacts with gastric juice remains an attractive working hypothesis.

We[5] have previously pointed out that there are three possible mechanisms by the action of one or more of which the disease, Addisonian pernicious anemia, may be produced, namely, a lack of the specific intrinsic factor of the stomach, a lack of the extrinsic factor of the diet, or a failure of absorption or utilization of the product of the interaction of the intrinsic and extrinsic factors. These postulates can now be shown to be consistent with the supposition that vitamin B_2 is the extrinsic factor.

1. All cases of classical Addisonian pernicious anemia in relapse which we have studied thus far, have been due to the operation of the first mechanism. That yeast is ineffective in this condition, has been clearly demonstrated[12, 13], now confirmed by us, and is what would be anticipated in the absence of the intrinsic factor.

2. Sprue with macrocytic anemia, on the other hand, has been successfully treated by Elders[15] and Ashford[16] with diets rich in animal protein (and hence rich in vitamin B_2) and more recently by one of us[10] in certain cases with yeast. Similarly Wills[8] has successfully treated tropical macrocytic anemia with autolyzed yeast alone and Vaughan and Hunter[9] have obtained definite results with the same substance upon the macrocytic anemia of celiac disease. These results may now be explained on the basis that in all probability the anemia was due to the second mechanism outlined above, namely, a lack of the extrinsic factor. Hence, with the intrinsic factor present, the administration of the extrinsic factor, either as yeast or in a diet high in animal proteins, should produce a remission. The correctness of this explanation is further suggested by the fact that acid was present in the gastric juice of most of the cases reported by Wills and in both of the cases cited by Vaughan and Hunter. Of course, unless the gastric juice of any individual case is specifically tested, no final conclusions can be drawn, but it is signifi-

cant that the intrinsic factor is present on biological assay of the gastric secretions of certain patients with sprue[10].

3. It must, however, be remembered that in certain cases of macrocytic anemia, the third possibility, namely, defects of absorption, may be involved as well as combinations of the first and second mechanisms. It has also been previously pointed out that the same mechanism may not always be active, and there is reason to believe that at times more than one mechanism may be involved in a given case[5].

It is now possible to explain why certain cases of macrocytic anemia will respond to both liver extract and autolyzed yeast and others only to liver extract. The difference appears to depend on the presence or absence of the intrinsic factor. In the light of this evidence it is clear that the common factor for producing the macrocytic anemia is the failure of the specific reaction between the extrinsic and the intrinsic factors. We should, therefore, expect to find these anemias both where on the one hand the diet is deficient in vitamin B_2, and on the other hand, where, although the diet is not deficient, gastric anacidity, indicating frequently a lack of the intrinsic factor, is found. Thus, sprue and the macrocytic anemias of the tropics occur in communities or in individuals partaking of defective diets and show gastric anacidity less commonly than is found in patients with Addisonian pernicious anemia, who usually have more normal diet habits. In many cases a combination of gastric defect and dietary deficiency may exist, which would have the same result upon the specific hematopoietic reaction as a total absence of either of its components.

It now appears probable that a simple and inexpensive product for the treatment of pernicious anemia may be made by allowing hogs' stomach mucosa (source of intrinsic factor) and yeast concentrates (vitamin B_2) to interact under the proper conditions, and then desiccating them. Such a product, however, would probably have the heat liability of hog stomach products generally. Since liver extract No. 343 (N. N. R.) is rich in vitamin B_2, the potentiation of this extract with hog stomach, as reported by Walden and Clowes[11] is now readily explained.

With the demonstration that vitamin B_2 may possibly be the extrinsic factor of the essential reaction for preventing the development of pernicious anemia in the normal individual, a way would seem to be opened for the experimental production in animals of a macrocytic anemia resembling pernicious anemia. Such an accomplishment would obviously afford a method of testing the potency of extracts of liver for use in pernicious anemia now possible only by clinical trial. With liver extracts containing vitamin B_2, it would, of course, be necessary to carry out the test by parenteral injection in order to prevent the vitamin from interacting with the gastric juice and so producing a "liver extract" effect.

We are tempted at this time to a possibly rash speculation based on the observations of one of us[17] on the production of experimental combined system disease in dogs by the use of diets deficient in vitamin B_1. In the affected animals, which always had free hydrochloric acid in the gastric contents, the oral administration of vitamin B_1, gave prompt relief of the nervous symptoms; whereas with rare exceptions the use of vitamin B_1 in the treatment of the cord lesions of pernicious anemia has been unsuccessful in contrast to the effectiveness of liver extract. Vitamin B_1 is certainly a close relative of vitamin B_2, and it is possible that interactions with a factor in the stomach have a significance for the central nervous system analogous to that which we have demonstrated for the bone marrow in the case of vitamin B_2. Just as we can now understand why vitamin B_2 has no effect in Addisonian pernicious anemia in which the essential gastric factor is absent, it may in the near future become clear why vitamin B_1 is relatively valueless for the treatment of the nervous lesions of the disease, although curative in the experimental condition in which the gastric function is apparently normal. If the "extrinsic factors" respectively for hematopoiesis and for the integrity of the central nervous system are different, it becomes possible to understand why all cases of macrocytic anemia do not have cord lesions and vice versa, especially in those instances in which the macrocytic anemia is mainly dependent on a lack of the extrinsic factor. On the other hand, if the process which leads to the disappearance from the stomach of the intrinsic factor for hematopoiesis is severe and so involves a hypothetical "intrinsic factor for the cord", we should expect a high degree of correlation between macrocytic anemia and cord lesions. In line with this reasoning is the clinical evidence that in cases of macrocytic anemia with free hydrochloric acid and probably the intrinsic factor present in the stomach contents, as often in sprue and the macrocytic anemia of the tropics, involvement of the central nervous system is uncommon. On the other hand, in Addisonian pernicious anemia, in which the gastric disturbance is obviously great and the intrinsic factor is in our experience invariably lacking, the association of anemia and cord lesions is frequent.

If the evidence that the extrinsic factor of the specific hematopoietic reaction with normal human gastric juice is vitamin B_2 be valid, a new concept of the relation of the vitamins to the diseases caused by their lack would seem to be involved. The action of a vitamin in curing a deficiency may thus be essentially dependent upon a specific process in the gastrointestinal tract, and the deficiency state not so much a deficiency in the diet as a deficiency of

a reaction in the gastro-intestinal tract. It would seem possible that this principle might have further applications than to the macrocytic anemias discussed in this paper and that in other types of deficiency disease specific disturbances of the gastro-intestinal tract, or even of the internal metabolism, might be all-important in delineating the characteristics of the deficiency state and in mediating or preventing its relief.

CONCLUSIONS

1. The extrinsic factor essential for the specific reaction with the intrinsic factor of normal human gastric juice in the production of hematopoiesis in pernicious anemia may now be defined as a substance closely related to vitamin B_2, if not vitamin B_2 itself.

2. It is, therefore, suggested as a working hypothesis that Addisonian pernicious anemia, the macrocytic anemia of the tropics, of sprue and of celiac disease are due, in common, to *the lack of a specific hematopoietic reaction between an extrinsic factor (vitamin B_2) and an intrinsic factor of the normal human gastric juice.*

In Addisonian pernicious anemia, in certain cases of sprue, as well as in all probability in a certain proportion of all cases of the macrocytic anemia of the tropics, *the specific reaction is absent mainly because of a lack of the intrinsic factor.*

In those cases of sprue, of macrocytic anemia of the tropics and of celiac disease which respond to the administration of yeast, *the specific reaction is absent, mainly because of a lack of the extrinsic factor as defined above.*

3. The incubation of hog stomach mucosa with yeast concentrates is suggested as a method for economically preparing hematopoietic substances for use in pernicious anemia.

4. The production of a specific macrocytic anemia in animals by the use of diets deficient in vitamin B_2 is suggested.

5. A possible analogy to the relation of vitamin B_2 to hematopoiesis through the specific gastric mechanism is suggested for vitamin B_1 in relation to the central nervous system.

REFERENCES

1 Castle, W. B., and Locke, E. A.: Observations on the etiological relationship of achylia gastrica to pernicious anemia. J. Clin. Investigation. 6: 2 (Aug.) 1928.

2 Castle, W. B.: Observations on the etiologic relationship of achylia gastrica to pernicious anemia: I. The effect of the administration in patients with pernicious anemia of the contents of the normal human stomach recovered after the ingestion of beef muscle. Am. J. M. Sc. 178: 748 (Dec.) 1929.

3 Castle, W. B., and Townsend, W. C.: Observations on the etiologic relationship of achylia gastrica to pernicious anemia: II. The effect of the administration to patients with pernicious anemia of beef muscle after incubation with normal human gastric juice. Am. J. M. Sc. 178: 764 (Dec.) 1929.

4 Castle, W. B., Townsend, W. C., and Heath, C. W.: Observations on the etiologic relationship of achylia gastrica to pernicious anemia: III. The nature of the reactions between normal human gastric juice and beef muscle leading to clinical improvement and increased blood formation similar to the effect of liver feeding. Am. J. M. Sc. 180: 305 (Sept.) 1930.

5 Castle, W. B., Heath, C. W., and Strauss, M. B.: Observations on the etiologic relationship of achylia gastrica to pernicious anemia. IV. A biologic assay of the gastric secretion of patients with pernicious anemia, etc. Am. J. M. Sc. 182: 741 (Dec.) 1931.

6 Minot, G. R., Murphy, W. P., and Stetson, R. P.: The response of the reticulocytes to liver therapy, particularly in pernicious anemia. Am. J. M. Sc. 175: 581 (May) 1928.

7 Block, R. J., Cowgill, G. R., and Klotz, B. H.: The antineuritic vitamin. J. Biol. Chem. 94: 765 (Jan.) 1932.

8 Wills, L.: Treatment of "pernicious anaemia of pregnancy" and "tropical anaemia" with special reference to yeast extract as a curative agent. Brit. M. J. 1: 1059 (June 20) 1931.

9 Vaughan, J. M., and Hunter, D.: The treatment by marmite of megalocytic hyperchromic anaemia. Lancet. I: 829 (Apr. 16) 1932.

10 Castle, W. B., and Rhoads, C. P.: The aetiology and treatment of sprue in Porto Rico. Lancet. I: 1198 (June 4) 1932. Tr. A. Am. Phys. in press.

11 Walden, G. B., and Clowes, G. H. A.: Pernicious anemia: method whereby therapeutic efficacy of liver and liver fractions may be substantially increased. Proc. Soc. Exper. Biol. & Med. 29: 873 (Apr.) 1932.

12 Cohn, E. J., Minot, G. R., Alles, G. A., and Salter, W. T.: The nature of the material in liver effective in pernicious anemia. II. J. Biol. Chem. 77: 325 (May) 1928.

13 Davidson, S.: Vitamin B in anaemia. Lancet. II: 1395 (Dec. 26) 1931.

14 Ackermann, D.: Zur Chemie der Vogelblutkerne. Ztschr. f. physiol. Chem. 43: 299 (Dec.) 1904.

15 Elders, C.: Tropical sprue and pernicious anaemia. Lancet. I: 75 (Jan. 10) 1925.

16 Ashford, B. K.: Sprue. Ann. Clin. Med. 4: 13 (July) 1925.

17 Gildea, E. F., Kattwinkel, E. E., and Castle, W. B.: Experimental combined system disease. New Eng. J. Med. 202: 523 (Mar. 13) 1930.

ORGANIZED MEDICINE AND CANCER

In addition to Massachusetts some of the other states are showing very definite interest in organized study of cancer problems. For example Texas, Arkansas, Louisiana, Tennessee and Mississippi have adopted a definite five year program and Kentucky, Georgia and Oklahoma are studying the needs of the situation in their respective states, with the probability of adopting similar plans. All of these programs involve the formation of permanent cancer commissions and definite coöperation with state and local departments of health, in addition to very close association with the American Society for the Control of Cancer.

One of the more recent organizations to show definite interest in cancer education work is the Amateur Chemists Society which was organized in November, 1931 by Fred Allan Lankton at Lansing, Michigan. The purpose of this organization is to develop interest and research in chemistry and to unearth the hidden talents among young chemists. The staff consists of a managing director, a director for Canada, a secretary, an educational director and a director for cancer research. Mr. Lloyd Varden, University of Kentucky, is chief of the technical staff.

The Amateur Chemists Society issues a semimonthly journal which disseminates information relating to experimental results and controversial discussions of its members. A cancer control bulletin together with a questionnaire has been sent to all members. The cancer research of this organization is under the direction of Charles Frederick Stanton of Natchez, Mississippi.

NEW HORIZONS IN PHYSIOLOGY AND MEDICINE: THE HYPOTHALAMUS AND VISCERAL MECHANISMS*

BY J. F. FULTON, M.D.†

Mr. President, Dr. Donley and Gentlemen:

IT has been the case in the past, and it will probably be true in the future, that the chief stimulus to the study of the functions of the human body has come from those engaged in the practice of medicine. Physiology, in fact, was first taught under the significant title, "Institutes of Medicine"; and that our special subject should have arisen in response to the needs of the clinic is a circumstance of which we are genuinely proud. I can assure you, therefore, that nothing could be more flattering to a physiologist than an invitation to address a medical society.

My interest in the subject under consideration had its origin in an unusual clinical experience which will always be vivid in my mind. I was mystified one morning in an outpatient department by the numerous and vague complaints of an Italian boy—who, incidentally, neglected to mention his chief trouble—and in order to temporize he was told to return with a "24-hour specimen". The next morning he arrived in a Ford car with sundry members of his family and six jugs containing 20 litres of pale, clear urine! I need scarcely remark that this was my first experience with diabetes insipidus. The case ultimately came to autopsy and was reported in detail with Percival Bailey (Case V[28], see also [29]). Among other things a small metastatic lesion was found in the tuber cinereum. The study of this region within the past few years has led to a new and highly important development in physiology, which is likely within the next decade to have a profound effect upon the progress of medical science. The recent disclosures have to do with the control exerted by the central nervous system upon the metabolic and other vegetative processes of the body. Such a control was predicted by Claude Bernard (See[27]), but the more significant discoveries bearing upon the subject have come within the last few years—largely from the anatomist and clinician. The late appearance of the physiologist in this virgin field is in my opinion a serious reflection upon his judgment, for great things were awaiting him and much of the fruit had already been gathered by his more far-sighted colleagues.

Before going into the subject it is perhaps well to utter a word of caution. The implications of the newer work are vast, and there is no branch of medicine, unless perhaps endocrinology, in which closely reasoned argument from ascertained facts is more urgently needed than in the study of the hypothalamus. Many long-cherished physiological and pharmacological conceptions must be abandoned as a result of what has already been found, but we must accept nothing until the evidence has been scrutinized rigidly and sympathetically. I add "sympathetically" because in some quarters the recent work on the hypothalamus has been received not only with scepticism—this is healthy—but with scorn—and this is dangerous, much more so than false inference drawn from hasty analysis of experimental data.

THE "MIND," THE BODY AND THE HYPOTHALAMUS

That the "mind" may exert a profound influence over bodily processes is a commonplace recognized among primitive peoples, by the great religions of the world, and by the practitioners of medicine of all ages. No one, moreover, seriously questions the association of "mind" with the central nervous system, and yet little is known concerning the way in which the brain brings about the profound changes of which it is capable in the bodily economy. To Dr. Cannon of Harvard we owe the first systematic study[13] of the grosser bodily changes resulting from states of mental excitement, fear, and rage. In his early investigations he found that certain emotional states were associated with increased activity of the sympathetic division of the autonomic nervous system and that this caused an outpouring of adrenin into the blood; the adrenin so liberated leads to a dramatic series of bodily adjustments—deflection of blood from viscera to brain and muscles, rise of blood pressure, increase in red cells, rise of blood sugar, diminution in coagulation time, etc.—changes calculated to prepare the body for combat or escape. It had been known since the time of Goltz[32] that manifestations of rage occurred in animals in which the cerebral hemispheres had been completely removed. Goltz's original description of the reactions of his decorticate animals[32] indicates clearly that these outbursts were also accompanied by activity of the sympathetic nervous system. Similar observations were made in chronic decorticate cats by Dusser de Barenne[26]. Philip Bard[2, 3] six years ago carried out a painstaking series of investigations in which he sought to delimit the part of the brain essential for the characteristic recurrent manifestations of rage and of hyperactivity of the sympathetic. Working on cats, he found that as the central nervous sys-

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tem was sectioned at various levels, the rage reactions continued to occur in marked form until he had excluded a small triangular segment of tissue just posterior to the stalk of the pituitary, and including certain centers in the posterior hypothalamus. The hemispheres, chiasm, and all the thalamic nuclei could be completely removed and manifestations of rage—"sham rage", as it was appropriately designated—continued to occur, generally spontaneously. When this small segment of tissue, scarcely 2 to 3 mm. in width, was removed, "sham rage" ceased to occur spontaneously, though in such preparations, as Keller[38] has since shown, the sympathetic nervous system can be provoked to activity if a sufficiently strong stimulus is used. Bard's investigations focused attention upon the hypothalamus, and they suggested that within this small area were situated the chief central ganglia of the sympathetic nervous system.

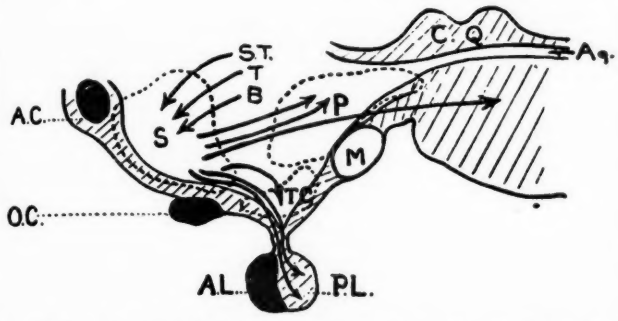


FIG. 1.—A diagram to show the situation of the various nuclear masses of the hypothalamus and the connections of the supra-optic group of nuclei, superimposed on the lateral wall of the third ventricle. A.C., anterior commissure; A.L., anterior lobe of the pituitary body; Aq., aqueduct of Sylvius; B., fibres from the medial forebrain bundle; C.Q., corpora quadrigemina; M., corpora mammillaria; O.C., optic chiasma; P., posterior group of nuclei; P.L., posterior lobe of the pituitary body; S., supra-optic group of nuclei; S.T., fibres from the stria terminalis; T., fibres from the thalamus; T.C., tuber nuclei.

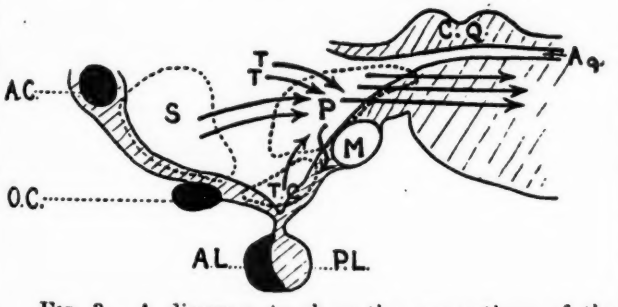


FIG. 3.—A diagram to show the connections of the posterior hypothalamic nuclei. Lettering as in Fig. 1.

FIG. 1. Beattie's[6] diagram showing the afferent and efferent connections of the supra-optic nuclei and (below) the connections of the posterior hypothalamic nuclei.

Before taking up more recent investigations, I should like to pause for a moment to give a brief account of the comparative anatomy of this important region.

The centers of the hypothalamus.—The most adequate anatomical account of the hypothalamus in vertebrate forms is that of Rioch[48, 49, 50], who enumerates the many discrete cell masses in the diencephalon and describes their connections. As yet the many anatomical subdivisions are of limited physiological significance (See Huber and Crosby[35]), and to simplify the problem for functional analysis the chief centers of the hypothalamus have been grouped tentatively by Beattie[6] into three major divisions: the supra-optic (or pre-optic) nuclei, the tuber nuclei, and the paraventricular nuclei. The last occupy the walls of the third ventricle in the area known as the posterior hypothalamus, and the first two lie in the floor and anterior wall of the third ventricle. Throughout the whole vertebrate scale there is no part of the forebrain that has maintained so constant a general arrangement during phylogeny and ontogeny[35, 48, 49, 50]. Despite the great elaboration of the cerebral hemispheres there has been very little change in this ancient group of nuclear masses. In embryological life the connections existing between this area and the more caudal segments, the medulla and spinal cord, are among the first to become established. Because of this and the constancy of its morphological characteristics from animal to animal, neuro-anatomists have long been aware that this area must be of fundamental importance to the organism[35, 48], but its relative inaccessibility had until recent years precluded an experimental analysis of its function.

The chief connections of the hypothalamic nuclei with other parts of the brain are summarized by Beattie[6] as follows (Fig. 1):

The supra-optic nuclei give *efferent* connections to: (1) the posterior lobe of the pituitary (and to the pars intermedia); (2) the periventricular gray matter and thence to the posterior hypothalamic nuclei; (3) the tuber nuclei; (4) the tegmentum. None of these efferent connections appear to cross to the opposite side. The *afferent* connections, though complex, fall into two groups: (1) those from the olfactory area (through the stria terminalis and medial forebrain bundle) and (2) those from the medial nuclei of the thalamus. Though cortico-supra-optic fibres have been found in lower forms (reptiles) their existence has not yet been demonstrated in mammals.

The tuber nuclei, which are themselves closely interconnected, give rise to four distinct systems of *efferent* tracts: (1) to the posterior lobe from Rioch's nucleus ventro-medialis; (2) large connections to the posterior hypothalamic nuclei; (3) small fibres passing through the periventricular nuclei and terminating in the central gray matter around the aqueduct; (4) a further physiologically important projection system that passes into the tegmentum and probably to the medulla and vagus nuclei (Beattie), but the full course has not yet been traced. The *afferent* connections of the tuber nuclei are chiefly from the thalamus, olfactory areas and median forebrain bundle.

The posterior hypothalamic nuclei give rise to fibres which, as is indicated below, establish *efferent* connection with the thoracic sympathetic outflow of the spinal cord, and they receive *afferent* fibres from the supra-optic and tuber nuclei, as we have just seen, and from the medial thalamus. No fibres have been demonstrated as coming directly from the cortex.

CENTRAL REPRESENTATION OF THE SYMPATHETIC SYSTEM

The observations of Bard[2, 3] had provided indirect evidence that the posterior hypothalamic nuclei are associated with the sympathetic division of the autonomic outflow; no information, however, was provided by his studies as to the way in which this area of the brain establishes its connection with the peripheral ganglia of the sympathetic. It remained, therefore, for Beattie, Brow and Long[8, 10] to supply this critical information. Approaching the region surgically by a transbuccal route, they were able in cats to make small lesions of the paraventricular nucleus on one side, and they later studied the resulting degenerations by the Marchi method and by the technique of Alzheimer-Mann. They found that a fairly large tract of small medullated fibres passed caudally from the site of the lesion around the aqueduct and into the medial longitudinal bundle; part of the fibres decussated at the level of the anterior part of the decussation of Forel. Those which did not end in the medulla passed into the ventral columns of the spinal cord; and the majority ultimately turned upward into the lateral columns of the spinal gray matter at the first and second thoracic levels, establishing a synaptic connection with the preganglionic fibres of the sympathetic nervous system. This anatomical proof of the direct association of the posterior hypothalamus with the sympathetic outflow clearly supplies the missing link in the evidence set forth by Bard. Further evidence, also by Beattie, Brow and Long[9], was obtained by quite another method.

The hypothalamus and the heart. — Beattie, Brow and Long[9] had repeated the old observations of A. G. Levy[40, 41, 42] and others that under chloroform anesthesia the heart is likely to pass into arrhythmia, characterized by the presence of many ventricular extrasystoles. It had been observed by Levy that the extrasystoles of chloroform anesthesia were not present after the stellate ganglion had been removed. Beattie and his co-workers observed, accidentally, that the extrasystoles similarly disappeared when an animal under chloroform was decerebrated at the intercollicular level thus excluding the hypothalamus; but that the extrasystoles remained when the "decerebration" was carried out in a plane which did not remove the posterior hypothalamic nuclei. The method of exclusion employed in this part of their investigations was similar to that which had been used by Bard in establishing the posterior hypothalamus as essential for the occurrence of "sham rage". Following this important lead, Beattie, Brow and Long[9] undertook to trace by physiological methods the structures essential for the occurrence of ventricular extrasystoles produced by chloroform anesthesia. Section of the posterior longitudinal bundle in the medulla caused it to disappear, as did section of the anterior roots of thoracic 2, 3 and 4. They then confirmed Levy's previous observation that destruction of the stellate ganglion on both sides similarly did away with chloroform irregularity.

Isolated destruction of the posterior hypothalamus itself in an otherwise normal animal similarly caused a disappearance of the systolic arrhythmia. Such a lesion, moreover, caused the animals to be sluggish and apathetic, with constricted pupils, low blood pressure, and a general state of inactivity which was precisely opposite to the picture which had been seen in Bard's pseudaffective animals. More recent observations of Keller[37, 38] indicate, moreover, that animals with lesions in this region lose their capacity for regulation of the body temperature.

Stimulation of the posterior hypothalamus.— Having established this intimate association between the hypothalamus and the control of the heart, it remained to show that direct stimulation of this area was capable of producing other well-known effects belonging to the sympathetic nervous system. In 1911 Karplus and Kreidl[36] had observed that direct stimulation of the hypothalamus caused marked rise in the blood pressure as well as dilatation of the pupils. Beattie, Brow and Long[8, 9] confirmed these observations, but were able also to observe marked ventricular extrasystoles from the stimulation of this region, which failed to disappear when the vagus was cut but, as in their previous observations, disappeared immediately after destruction of the stellate ganglion. These stimulation experiments have been repeatedly confirmed, and I have been able to repeat them in my own laboratory in the cat, dog, and monkey.

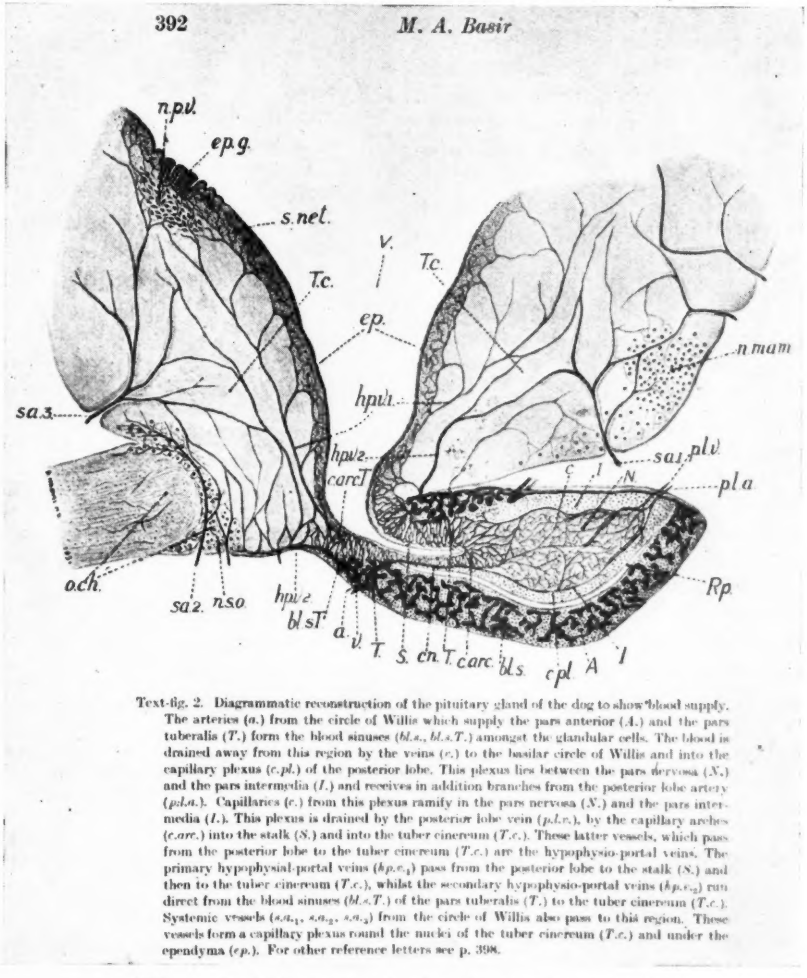
More recently Beattie, Duel and Ballance[11] have performed the ingenious experiment of anastomosing the central cut end of the cervical sympathetic trunk with various peripheral motor nerves supplying the neck and tongue. After an interval of five to six months, stimulation of the posterior hypothalamic nuclei gives responses of the muscle into which the sympathetic trunk has regenerated. Various crucial controls were instituted, such as cutting the sympathetic outflow proximal to the anastomosis, which invariably abolished the effect.

THE CENTRAL REPRESENTATION OF THE PARASYMPATHETIC DIVISION OF THE AUTONOMIC NERVOUS SYSTEM

The parasympathetic outflow differs from the sympathetic in that its various component

nerves discharge, as a rule, individually; that is, the diffuse generalized outburst of activity which occurs in all branches of the sympathetic during extreme emotion is not commonly seen in the parasympathetic division*. But in certain special circumstances, *e.g.*, vomiting and some forms of syncope, many branches of the parasympathetic outflow discharge in unison. Consequently it would be expected *a priori* that some central integrating center exists which is capable of calling all branches of the parasympathetic division into activity simultaneously; but since the component nerves of this division are capable in addition of individual activity, the neural connections of such an integrating center would be more extensive than for the centers of the sympathetic division, where individual activity does not occur. As we have seen, the connections of the posterior hypothalamic nuclei are, in fact, relatively simple, but those of the tuber and supra-optic nuclei are vastly more complex, and it is perhaps significant that no definite function had until very recently been assigned to these many nuclear masses.

The first well-substantiated suggestion[22] that a parasympathetic center exists in the diencephalon was made a year ago by Dr. Harvey Cushing. His conclusion was based on a series of observations on the results of introducing pituitrin and certain drugs[17, 18, 19, 20, 21] into the lateral ventricles of the human brain. A lifelong interest in the physiological action of the secretion of the posterior lobe had led Cushing to believe that the hormone is normally secreted into the cerebrospinal fluid. The anatomical studies, however, of Popa and Fielding[46, 47] and more recently those of Basir[4] had indicated that a "portal circulation" exists between the pituitary body and certain hypothalamic centers (Fig. 2), notably those of the tuber. It seemed possible, therefore, that the hormone might be



Text-fig. 2. Diagrammatic reconstruction of the pituitary gland of the dog to show blood supply. The arteries (*a.*) from the circle of Willis which supply the pars anterior (*A.*) and the pars tuberalis (*T.*) form the blood sinuses (*bl.a., bl.s.T.*) amongst the glandular cells. The blood is drained away from this region by the veins (*c.*) to the basilar circle of Willis and into the capillary plexus (*c.pl.*) of the posterior lobe. This plexus lies between the pars nervosa (*N.*) and the pars intermedia (*I.*) and receives in addition branches from the posterior lobe artery (*p.l.a.*). Capillaries (*c.*) from this plexus ramify in the pars nervosa (*N.*) and the pars intermedia (*I.*). This plexus is drained by the posterior lobe vein (*p.l.v.*), by the capillary arches (*c.arc.*) into the stalk (*S.*) and into the tuber cinereum (*T.c.*). These latter vessels, which pass from the posterior lobe to the tuber cinereum (*T.c.*) are the hypophysio-portal veins. The primary hypophysial-portal veins ($hp.v._1$) pass from the posterior lobe to the stalk (*S.*) and then to the tuber cinereum (*T.c.*), whilst the secondary hypophysio-portal veins ($hp.v._2$) run direct from the blood sinuses ($bl.s.T.$) of the pars tuberalis (*T.*) to the tuber cinereum (*T.c.*). Systemic vessels ($s.a._1$, $s.a._2$, $s.a._3$) from the circle of Willis also pass to this region. These vessels form a capillary plexus round the nuclei of the tuber cinereum (*T.c.*) and under the ependyma (*ep.*). For other reference letters see p. 398.

FIG. 2. Basir's[4] diagram showing the vascular connections between the posterior lobe and the hypothalamic centers of the dog. The lettering is explained in the author's legend included in the photograph.

*It is undoubtedly significant that adrenin, the chief hormone of the sympathetic division, which appears to be liberated wherever sympathetic nerves end (Cannon and Blaq), is a relatively stable substance, readily carried by the blood stream from one part of the body to another; while acetyl choline or some closely allied body which appears to be liberated wherever parasympathetic nerves terminate (Dale and Gaddum) is relatively unstable and is rapidly destroyed in the blood stream. We cannot here enter into the literature concerning the peripheral hormones of the autonomic system, but it is worth while to emphasize that Dale's theory has this important consideration in its favor—a point that seems not to have been stressed previously.

secreted directly into the substance of the hypothalamus as well as into the cerebrospinal fluid*.

Intraventricular injections.—In order to put this hypothesis to test, and to ascertain whether a patient suffering from posterior-lobe deficiency would be benefited by the new procedure, Cushing injected 1.0 c.c. of surgical pituitrin directly into the lateral ventricles. Within two to three minutes a most dramatic response occurred: A profuse drenching perspiration began to pour out all over the body except from the denervated area of skin over the bone flap. Associated with this was an intense flushing of the corresponding areas of skin, fall in blood pressure, increased peristalsis of stomach and intestines, and within a period of two hours a fall in rectal temperature from 99.8 to 94.2°. Vomiting also occurred after an interval of about an hour. It will be seen that all of these manifestations are essentially those associated with activity of the parasympathetic nervous system. Perhaps the most striking and unexpected change was a fall in body temperature of 5.5°F. and with this was an associated drop in basal metabolism of 20 points. The observations have been repeatedly confirmed in many other patients.

It was of course evident that pituitrin might act upon centers adjacent to any part of the ventricular system; or it might be directly absorbed through the ependymal wall into the blood stream. The latter possibility is virtually excluded by the fact that pituitrin introduced into the blood stream at any point has precisely opposite effects from those observed on its intraventricular administration. With the observations of Popa and Fielding[46, 47] and of Basir[4] in mind, it seemed probable that pituitrin might act upon the diencephalic centers affected by the "portal circulation" from the pituitary. In favor of this is the fact that patients having third-ventricle tumors blocking the foramen of Monro failed to respond to pituitrin injected into the lateral ventricles[20].

The question of the specificity of pituitrin naturally arises. Are the reactions observed due to the pituitrin fraction, or can they possibly be explained by the impurities known to be present in surgical pituitrin? Dr. Cushing has informed me that the chemically pure fractions of pitressin supplied by Dr. Abel caused exactly the same response as surgical pituitrin, and that histamine, the most common impurity in pituitary preparations, well known as a "flushing body," was quite without action when introduced into the human ventricle[23, 24]. Moreover, if the effects were due to impurities in the pituitrin one would expect to see them as prominently after intravenous or intramuscular administration as following intraventricular injection, but this definitely is not the case[24].

Pilocarpine, however, injected intraventricularly[18] is capable of duplicating nearly all of the effects given by pituitrin, including flushing, sweating, and sundry vagal effects, *e.g.*, violent peristalsis of the stomach observed fluoroscopically, pyloric spasm, nausea, and vomiting. The fall in body temperature was less marked with pilocarpine than with pituitrin. The amount of pilocarpine required to produce these effects is considerably less when introduced into the ventricle than when given subcutaneously[24]. The effects of both pituitrin and pilocarpine are arrested by atropine administered by the ventricle or subcutaneously.

Further evidence which favors ascribing the site of action of pituitrin to the hypothalamic centers comes from the fact that small doses of avertin, as well as of certain of the barbiturates, prevent or inhibit the effect of intraventricular pituitrin and pilocarpine. These drugs are known to act on the deeper centers, particularly those of the thalamus and hypothalamus, while leaving the cerebral cortex excitable[31, 21]. Furthermore Himwich, Haynes, and Fazikas[34] have shown that the changes in blood sugars and lactic acid produced by pituitrin in normal animals (and in hypothalamic preparations) fail to occur after small doses of sodium amytal.

On the basis of this and other evidence Cushing reached the following conclusions:

"It may be assumed: (1) That under emotional stimuli the posterior pituitary becomes discharged through its specific and histologically demonstrable diencephalohypophysial mechanism; (2) that the active principle or a portion of it enters the cerebrospinal fluid whence presumably by diffusion through the ependyma it may come to act upon diencephalic nuclei for the parasympathetic apparatus; (3) that conditions may conceivably arise when posterior pituitary hormone is discharged into the fluid in sufficient strength to call forth a parasympathetic (cranial autonomic) response as diffuse in its character as is the response on the part of the sympathetic system brought about by the discharge of adrenalin. The neuro-hypophysis, in short, may conceivably bear a somewhat similar relation to the parasympathetic division that the adrenal medulla does to the sympathetic division of the autonomic nervous system." ([22], p. 263.)

Stimulation of the tuber nuclei.—If a drug acting locally on parasympathetic nuclei is capable of producing parasympathetic effects, it should be possible to cause these nuclear masses to respond by faradic stimulation. Karplus and Peczenik[36a] had observed that stimulation of the tuber nuclei gives rise to an increased concentration of pituitrin in the cerebrospinal fluid. Quite recently Beattie[7] has observed that stimulation of a similar area with bipolar electrodes causes action currents in the vagus, increase in auriculoventricular conduction time, decrease in heart rate, dilatation of the ear vessels, contraction of the bladder, increased peristalsis of the stomach and intestines, hyperemia of the stomach mu-

*As indicated in Figure 2, the studies of Basir[4], published only a few weeks ago, have shown that there is not one but actually two systems of vessels carrying blood from the capillary bed of the posterior lobe to the capillary bed of the tuber and supra-optic nuclei. The functional implications of this remarkable anatomical finding are obviously of first importance.

cosa, and an increased secretion of acid gastric juice[5]. Section of the vagi entirely abolished the gastro-intestinal effects of stimulation of the tuber[5]. Since every precaution was taken to prevent escape of stimulating current, and since precisely the opposite effects were observed when the posterior hypothalamic nuclei were stimulated (a point only 2 to 3 mm. posterior to the region from which the above parasympathetic effects were obtained), it is evident that the diencephalon contains centers influencing the parasympathetic outflow, and there is reason to believe that these centers are, in fact, the head ganglia of the parasympathetic system, since corresponding effects have not been obtained on stimulating higher levels of the forebrain.

There are many other aspects of the newer work on the hypothalamus which also invite our closest attention and study. The regulation of fat, carbohydrate, and water metabolism is intimately linked up with this region, as are certain other important vegetative activities, *e.g.*, heat regulation, sexual activity, and the control of the bladder. In the early clinical literature there was much confusion between symptoms referable to pituitary dysfunction and those due to hypothalamic injury[16, 28, 29] and the two groups of symptoms have not yet been adequately segregated. The innervation of the various parts of the pituitary makes it quite clear why difficulties have arisen. The posterior lobe receives a rich innervation from the tuber nuclei, and the anterior lobe derives its nerve supply from the sympathetic via the carotid plexus. The posterior hypothalamic nuclei, it would appear, send their descending fibres down to the upper thoracic levels, and from there preganglionic fibres pass upward, ultimately reaching their destination in the anterior lobe[16]. Little wonder that those who early investigated this difficult problem sometimes argued circuitously! In the rabbit and cat ovulation does not occur after coitus if the hypothalamus is destroyed, and it similarly fails to occur if the anterior lobe of the pituitary is removed. Whether destruction of the sympathetic innervation interferes with this important physiological function has not yet been ascertained.

I do not propose to enter into a discussion of the relations between the hypothalamic and pituitary mechanisms. This has been dealt with recently by other investigators[16]. To practising physicians perhaps the most significant recent disclosure relates to the influence of the hypothalamus on the gastro-intestinal tract.

PEPTIC ULCERS

Writing in 1841, Carl Rokitansky[51] remarked: "Gelatinous softening of the stomach commonly runs a subacute course . . . It is frequently founded upon a demonstrable affection of the brain, principally hypertrophy, or hydrocephalus; and this fact renders it probable that there is a similar causative nexus in those cases also, in which no visible anomalies have been hitherto detected in the infantine brain. Perhaps the proximate cause may be looked for in diseased innervation of the stomach, owing to a morbid condition of the vagus, and to extreme acidification of the gastric juice." (p. 36). In his stimulating Balfour Lecture, delivered April 8, 1931[25], Cushing pointed out that the neurogenic view of ulcer formation originally taught by Rokitansky still survives in the literature of the Vienna school; but that the cellular pathology of Virchow had drawn attention away from the larger aspects of the problem of ulcer and had concentrated attention rather upon the cellular changes within the stomach itself. According to Virchow the occlusion of a small vessel in the stomach wall leads to an area of diminished resistance which becomes digested by the stomach's own ferments. The Virchow school virtually lost sight of the possible relation of the local change to the innervation of the stomach and hence to the nervous system. Rokitansky, on the other hand, is stated to have demanded a careful examination of the base of the brain in all cases in which ulcer or softening of the stomach had been disclosed. What, then, can be the relation of the latest disclosures concerning the central representation of the autonomic nervous system to the genesis of peptic ulcer? The story is interesting and important, and may be told in chronological fashion.

Underhill and Freiheit[53] in 1928, repeating and extending the early experimental work of Westphal and Katsch[54], had found that large doses of pilocarpine injected subcutaneously in rabbits caused acute ulceration of the stomach and duodenum. More recently Light, Bishop and Kendall[43], stimulated by Cushing's results on injecting pilocarpine into the ventricles, have found that similar ulceration can be produced in rabbits by intraventricular injection of much smaller doses of pilocarpine than were necessary by the subcutaneous route*[53]. As in human beings, small amounts of pilocarpine introduced into the ventricle immediately cause peristaltic churning of the stomach, pyloric spasm, increased secretion of the gastric juice, and hyperemia of the stomach mucosa. If uninhibited by the administration of atropin, one finds within a few hours blood in the feces, and in the vomitus if vomiting occurs. Acute ulcers form within 24 to 48 hours.

Four years ago Ingraham and I[30] had occasion to make bilateral lesions of the base of the frontal lobe in cats, just anterior to the supraoptic nuclei and in some instances including the anterior portion of this nuclear mass. Our purpose was to release the hypothalamic nuclei from the control exerted by higher centers. We found after such a lesion that the animal became

*Bishop and Bysshe[44] have since extended their observations to monkeys, but their attention has been focused more particularly on parasympathetic responses other than those of the gut.

hyperexcitable and prone to outbursts of snarling and scratching along with other signs of rage and activity of the sympathetic nervous system. Some 50 animals were studied, and in going over our protocols recently we have found that four, at least, of these animals succumbed obscurely to peritonitis. We fancied that our intraperitoneal anesthesia had been given carelessly, and the matter rested there.

During the past two years A. D. Keller, formerly of the Laboratory of Physiology at Yale and now Professor of Physiology at Alabama, has been studying the relation of the hypothalamus to heat regulation[37, 38], and he had found that the integrity of the hypothalamic nuclei is essential to this function. He, too, had made lesions in the region of the base of the brain in order to isolate the hypothalamus from higher control, and last January discovered that the cases of peritonitis occurring after such lesions had been caused by perforation of the stomach or duodenum. His observations were briefly summarized at the meeting of the Federation of American Societies for Experimental Biology on April 30 of this year[39], and the full report will be published in due course. It appears from his work that certain lesions of the base of the brain provide a sufficient stimulus to cause localized erosion and softening of the walls of the gastro-intestinal tract, similar possibly to those described by Rokitansky. Dr. Keller is rightly cautious in the interpretation of his results, and for the time being he proposes to make no statement as to the possible relations of his pathological findings to peptic ulcer or to the gastric erosions produced by intraventricular pilocarpine.

The greatly increased peristalsis of the gastro-intestinal tract following administration of pilocarpine by ventricle is in harmony with the observations of Beattie on direct faradic stimulation of the tuberal and supra-optic nuclei[5, 6], and it should be borne in mind that in his experiments section of the vagus completely abolishes the motor effects of such a stimulus. We do not yet know whether vagotomy will prevent intestinal erosions resulting from pilocarpine injection or from lesions of the hypothalamus; but it is evident that these results are highly significant and the course which experimental work in this field will take during the next few years is clearly defined. All stages of the local pathological change in the gut wall *antecedent* to the formation of experimental ulcers must be studied, and until this is done it is quite impossible to establish their identity with the ulcers, acute or chronic, observed in clinical cases. Thus, one cannot conclude that the etiology of peptic ulcer has been established. Grossly, the pilocarpine erosions of animals are said to be similar to acute ulcer in man, but this is as far as the analogy can be carried, and it would be extremely unfortunate if anyone were led to believe from available experimental observations that the neurogenic factor was the only one to be considered in clinical cases. When the early stages of acute ulceration in man have been compared with those of the experimental animal, then, and only then, will it be possible to consider the question of a common etiology; and this brings one to the final consideration, in which even greater caution must be exercised.

There is an unfortunate tendency in the writings of some physiologists to deduce therapeusis from function. The gap in this particular instance is wide, and until every factor in the etiology of the neurogenic ulcer has been rigorously analyzed no suggestion as to surgical intervention can be seriously entertained. I refer more particularly to the inferences which have been made concerning the desirability of interrupting the outflow of the autonomic nervous system. The only positive experimental evidence which would favor interruption of the vagus innervation is that of Beattie. He has shown that the visceral effect of stimulating the tuber disappears after vagotomy[5]. Stubborn pyloric spasm has in certain instances been relieved by subdiaphragmatic vagotomy, but there is as yet no experimental evidence indicating that a similar operation prevents the neurogenic erosion, or the acute ulcer caused by scalds and burns.

DISCUSSION AND CONCLUSIONS

When one enumerates all of the vegetative functions said to be disturbed by lesions of the base of the brain, one can understand why a feeling of scepticism has arisen concerning the activities of this important area. We have dealt with its influence on the heart and gut; there is no doubt that the hypothalamus also regulates carbohydrate, fat, and water metabolism; furthermore, heat regulation, vasomotor control, sexual functions, and the activity of all other organs innervated by the autonomic nervous system are to some extent under the control of this area. When listed in this way one cannot readily grasp the reason for, or the full significance of, this intimate association with so many diverse bodily functions. However, on applying the broader conceptions of Cannon[13] the real significance becomes apparent. The sympathetic center of the autonomic system, located in the posterior hypothalamus, brings about those adjustments essential for escape and combat; from the point of view of the body as a whole the adjustments are of a spendthrift character—the temperature is raised, the heart becomes accelerated, and the energy reserves are mobilized.

Activity of the parasympathetic division, on the other hand, brings about conservation of the bodily resources[13]. Temperature and metabolism fall, the pupils constrict, and the glyco-

gen reserves of the body become replenished. Gastro-intestinal activity, moreover, is increased and foodstuffs are made available to the organism.

Sleep.—Speaking broadly, sleep, that relentless physiological process which is also associated with the processes of digestion, is essentially a parasympathetic function. Much of a speculative character has been written about the so-called "sleep center". Hypersomnia associated with lesions of the hypothalamus is, however, a well-recognized clinical entity[28], and it indicates clearly that the phenomenon of sleep is in some way regulated by this area. From the point of view of experiment I think we must attach considerable significance to two recent disclosures concerning the physiology of sleep. Hess[33] of Zurich has implanted electrodes into the thalamic and hypothalamic areas of various animals, and on recovery he has been able to produce all the signs of normal physiological sleep by weak faradic stimulation. When the electrodes fail to reach the deeper nuclei the stimulation is without obvious effect. Hess has also observed other signs of parasympathetic and of sympathetic stimulation in response to electrical excitation of this character. His full results have not yet been reported, but the first parts of his monograph, dealing with methods and effects on respiration and circulation, were issued in Germany several weeks ago.

Reports have just reached this country that Zondek[55] of Berlin has succeeded in isolating a bromine-containing hormone from the pituitary gland, which on injection produces a state of lethargy said to be identical with sleep. The hormone, furthermore, is reported to be present in the cerebrospinal fluid of normal human beings, but in patients with manic-depressive psychoses the concentration is greatly diminished. It is too soon to pass judgment upon these remarkable findings, but in view of them one is naturally reminded of the action of other bromine-containing drugs such as tribromethanol ("avertin"), which are known to affect subcortical centers. The similarity between sleep and "avertin" anesthesia has frequently been emphasized.

Afferent control.—The afferent regulation of the hypothalamic nuclei is still obscure. We have seen that all the nuclei of the diencephalon receive afferent fibre tracts from more rostral centers, but there is a peculiar paucity of fibre connections from the lower centers. A large body of evidence exists, however, suggesting that these centers are stimulated directly by chemical changes in the blood—in this respect retaining the characteristics of a primitive mechanism. Thus, when blood containing a high concentration of reducing substance is led to the hypothalamus and medulla, insulin is liberated, apparently through action of the vagus. I am aware that this conclusion has been contested, but I have found the original positive results far more convincing than the negative results more recently reported, since these have been complicated by the use of barbituric-acid anesthesia which abolishes hypothalamic activity. The thalamic and hypothalamic centers, as Barbour and others have shown, also respond to the *temperature* of the blood received. Thus, if blood of 40°C. is brought to the thalamus, the parasympathetic system is thrown into activity and a series of highly integrated responses occur, *i.e.*, sweating, vasodilatation, and diminished oxidation, all calculated to cause a fall in body temperature.

Finally, the idea that the vegetative centers are controlled directly by chemical agents is borne out by the observations on pituitrin and pilocarpine. Intraventricular injection studies strongly suggest that pituitrin exerts its effect on the body by direct action on the hypothalamic centers. In fact *it would appear that its central action is its normal action,* for the vascular connections between posterior lobe and hypothalamus are such that only small amounts of pituitrin could be expected to reach the general circulation; and this is the more important since the central effect of pituitrin is almost diametrically opposite to its peripheral action. This has naturally raised the question of peripheral versus central action in the case of many drugs. Pilocarpine, for example, is said to act peripherally. This it certainly does, but it is immensely more potent when introduced into the ventricular system of the brain—and the presumption, therefore, is that its chief effects are brought about through its central influence. In that large group of drugs known as the antipyretics, central action has long been recognized, but it has not been analyzed in strictly physiological terms. There can be little doubt that careful study of the physiological action of the vegetative centers will lead to a deeper insight into the mode of action of all drugs affecting the autonomic nervous system both in its central and peripheral ramifications; and it is scarcely necessary to add that it will require many years of concentrated study on the part of the pharmacologist to untangle the existing confusion concerning central and peripheral action.

In closing I would like to remind you of the conception of the "milieu intérieur". Claude Bernard[12] pointed out that higher animals became independent of their external environment through having evolved a mechanism for maintaining constancy of their internal milieu—temperature, salt, hydrogen-ion concentration, etc. The way in which higher organisms maintain this remarkable constancy has long been one of the mysteries of physiology, but as time goes on it has become evident that the various centers of the autonomic nervous system are large-

ly, if not entirely, responsible for maintaining the internal equilibrium of the body. Since the ultimate aim of therapeusis is to restore bodily equilibrium it is clear that intensive study of these regulatory mechanisms by the physician will bear rich fruit. To the physiologist this conception opens new horizons since it allows him to visualize more adequately than ever before the integrated functions of the organism as a whole.

BIBLIOGRAPHY

1 Bailey, P., and F. Bremer: "Experimental diabetes insipidus." Arch. Int. Med., 1921, 28, 773-803.

2 Bard, P.: "A diencephalic mechanism for the expression of rage with special reference to the sympathetic nervous system." Amer. Journ. Physiol., 1928, 84, 490-515.

3 Bard, P.: "The central representation of the sympathetic nervous system as indicated by certain physiological findings" in "The Vegetative Nervous System." Research Pub. Assoc. Res. Nerv. & Ment. Dis., 1930, 9, 67-91. (Good bibliography.)

4 Basir, M. A.: "The vascular supply of the pituitary body in the dog." Journ. Anat., 1932, 66, 387-398. Pl. I.

5 Beattie, J.: "The relation of the tuber cinereum to gastric and cardiac functions. (A preliminary note.)" Canadian Med. Assoc. Journ., 1932, 26, 278.

6 Beattie, J.: "Hypothalamic mechanisms." Canadian Med. Assoc. Journ., 1932, 26, 400-405.

7 Beattie, J.: "Action currents in peripheral autonomic nerves following stimulation of the hypothalamus." Science, 1932, 75 (in press).

8 Beattie, J., G. R. Brow, and C. N. H. Long: "Physiological and anatomical evidence for the existence of nerve tracts connecting the hypothalamus with spinal sympathetic centres." Proc. Roy. Soc., 1930, 106B, 253-275.

9 Beattie, J., G. R. Brow, and C. N. H. Long: "The hypothalamus and the sympathetic nervous system. Part 1: The dependence of the extrasystolic arrhythmia of the heart produced by chloroform, upon the integrity of the sympathetic nervous system; and the use of this arrhythmia as an indicator of sympathetic activity" in "The Vegetative Nervous System." Research Pub. Assoc. Res. Nerv. & Ment. Dis., 1930, 9, 249-294.

10 Beattie, J., G. R. Brow, and C. N. H. Long: "The hypothalamus and the sympathetic nervous system. Part 2: The higher connections of the sympathetic nervous system as studied by experimental lesions of the hypothalamus." *Ibid.*, 1930, 26, 295-316.

11 Beattie, J., A. B. Duel, and C. Ballance: "The effects of stimulation of the hypothalamic pupillo-dilator centre after successful anastomoses between the cervical sympathetic and certain motor nerves." Journ. Anat., 1932, 66, 283-299.

12 Bernard, C.: Leçons sur les phénomènes de la vie communs aux animaux et aux végétaux. Paris: Baillière, 1878-79. 2 vols. xxxii + 404 pp.; xii + 564 pp., 3 pl.

13 Cannon, W. B.: Bodily changes in pain, hunger, fear and rage. New York: D. Appleton and Co., 2nd ed., 1929. xviii + 404 pp.

14 Cannon, W. B.: "The sympathetic division of the autonomic system in relation to homeostasis." Arch. Neurol. Psychiat., 1929, 22, 282-294. See also Physiol. Rev. 1929, 9, 399-431.

15 Cannon, W. B.: The wisdom of the body. New York: W. W. Norton, 1932. 312 pp.

16 Cushing, H.: "Neurohypophysial mechanisms from a clinical standpoint." (Lister Memorial Lecture, July 9, 1930.) Lancet, 1930, 2, 119-127; 175-184.

17 Cushing, H.: "I. The reaction to posterior pituitary extract (pituitrin) when introduced into the cerebral ventricles." Proc. Nat. Acad. Sci., 1931, 17, 163-170.

18 Cushing, H.: "II. The similarity in the responses to posterior lobe extract (pituitrin) and to pilocarpine when injected into the cerebral ventricles." *Ibid.*, 1931, 17, 171-177.

19 Cushing, H.: "III. The action of atropine in counteracting the effects of intraventricular pituitrin and of pilocarpine." *Ibid.*, 1931, 17, 178-180.

20 Cushing, H.: "IV. The method of action of intraventricular pituitrin." *Ibid.*, 1931, 17, 239-247.

21 Cushing, H.: "V. The counteractive effect of tribromethanol (avertin) on the stimulatory response to pituitrin injected in the ventricle." *Ibid.*, 1931, 17, 248-253.

22 Cushing, H.: "VI. Concerning a possible 'parasympathetic centre' in the diencephalon." *Ibid.*, 1931, 17, 254-265.

23 Cushing, H.: "Further concerning a parasympathetic centre in the interbrain. VII. The effect of intraventricularly-injected histamine." *Ibid.* (in press).

24 Cushing, H.: The Same. "VIII. The comparative effects on gastric motility of intramuscular and intraventricular pituitrin, pilocarpine, and histamine." *Ibid.* (in press).

25 Cushing, H.: "Peptic ulcer and the interbrain." (Balfour Lecture, Toronto, 1931.) Surg. Gynec. & Obst., 1932, 55, 1-32.

26 Dusser de Barenne, J. G.: "Recherches expérimentales sur les fonctions du système nerveux central, faites en particulier sur deux dont le néopallium avait été enlevé." Arch. Néerland. de Physiol., 1919, 4, 31-123.

27 Fulton, J. F.: "Claude Bernard and the future of medicine." Canadian Med. Assoc. Journ., 1932 (July).

28 Fulton, J. F., and P. Bailey: "Contribution to the study of tumors in the region of the third ventricle: Their diagnosis and relation to pathological sleep." Journ. Nerv. & Ment. Dis., 1929, 69, 1-25, 145-164, 261-277.

29 Fulton, J. F., and P. Bailey: "Nueva contribucion sobre los tumores del tercer ventriculo. Su asociacion con el sindrome de Recklinghausen y con el edema de Quincke." Arch. Argentinos de Neurol., 1930, 5, 3-27.

30 Fulton, J. F., and F. D. Ingraham: "Emotional disturbances following experimental lesions of the base of the brain (pre-chiasmal)." Journ. Physiol., 1929, 67, Proc., xxvii-xxviii.

31 Fulton, J. F., E. G. T. Liddell, and D. Rioch: "'Dial' as an anaesthetic for surgical operations on the nervous system." Journ. Pharm. & Exper. Therap., 1930, 40, 423-432. (Prelim. note, same title, Journ. Physiol., 1930, 70, Proc., xxiii.)

32 Goltz, F.: "Der Hund ohne Grosshirn." Pfluger's Arch., 1892, 51, 570-614.

33 Hess, W. R.: "Beitrage zur Physiologie des Hirnstammes. I. Teil. Die Methodik der lokalisierten Reizung und Ausschaltung subkortikaler Hirnabschnitte." Leipzig: Thieme. 1932, 122 pp. [The effects on respiration and circulation have just been published separately.]

34 Himwich, H. E., F. W. Haynes, and J. F. Fazikas: "Effect of posterior pituitary extracts on the constituents of the blood." Amer. Journ. Physiol. (in press).

35 Huber, G. C., and E. C. Crosby: "Somatic and visceral connections of the diencephalon" in "The Vegetative Nervous System." Research Pub. Assoc. Res. Nerv. & Ment. Dis., 1930, 9, 199-248. (Excellent bibliography.)

36 Karplus, J. P., and A. Kreidl: "Gehirn und Sympathicus. III. Mitt. Sympathicusleitung im Gehirn und Halsmark." Pflüger's Arch., 1911, 143, 109-127.

36a Karplus, J. P., and O. Peczenik: "Ueber die Beeinflussung der Hypophysentätigkeit durch die Erregung des Hypothalamus." Arch. ges. Physiol., 1930, 225, 654-669.

37 Keller, A. D.: "Observations on the localization of the heat regulating mechanisms in the upper medulla and pons." (Preliminary note.) Amer. Journ. Physiol., 1930, 93, 665.

38 Keller, A. D.: "Autonomic discharges elicited by physiological stimuli in midbrain preparations." Amer. Journ. Physiol., 1932, 100, 576-586.

39 Keller, A. D.: "Ulceration in the digestive tract following experimental lesions in the hypothalamus." Communicated at the meeting of the Federation of American Societies for Experimental Biology, Philadelphia, April 30, 1932.

40 Levy, A. G.: "The exciting causes of ventricular fibrillation in animals under chloroform anaesthesia." Heart, 1913, 4, 319-378.

41 Levy, A. G.: "The genesis of ventricular extrasystoles under chloroform; with special reference to consecutive ventricular fibrillation." Heart, 1914, 5, 299-344.

42 Levy, A. G.: "Further remarks on ventricular extrasystoles and fibrillation under chloroform." Heart, 1919, 7, 105-110.

43 Light, R. U., C. C. Bishop, and L. G. Kendall: "Production of gastric erosions in rabbit by injection of small amounts of pilocarpine into the cerebrospinal fluid." Journ. Pharm. Exper. Therap., 1932 (in press).

44 Light, R. U., and Stanley M. Bysshe: "The administration of drugs into the cerebral ventricles of monkeys:—pituitrin, certain pituitrin fractions, pitressin, pitocin, histamine, acetyl choline, and pilocarpine." (In press.)

45 Penfield, W.: "Diencephalic autonomic epilepsy." Arch. Neurol. Psychiat., 1929, 22, 358-374.

46 Popa, G., and Una Fielding: "The vascular link between the pituitary and the hypothalamus." Lancet, 1930, 2, 238-240.

47 Popa, G., and Una Fielding: "The portal circulation from the pituitary and the hypothalamus." Journ. Anat., 1930, 65, 88-91.

48 Rioch, D.: "Studies on the diencephalon of carnivora. Part 1: The nuclear configuration of the thalamus, epithalamus, and hypothalamus of the dog and cat." Journ. Comp. Neurol., 1929, 49, 1-90, 13 Pl.

49 Rioch, D.: The Same. "Part 2: Certain nuclear configurations and fiber connections of the subthalamus and midbrain of the dog and cat." *Ibid.*, 1929, 49, 121-144, 4 Pl.

50 Rioch, D.: The Same. "Part 3: Certain myelinated-fiber connections of the diencephalon of the dog (canis familiaris), cat (felis domestica), and aevisa (crossarchus obscurus." *Ibid.*, 1931, 53, 319-388.

51 Rokitansky, C.: Handbuch der Pathologischen Anatomie. Bd. 3, Vienna, 1841. (Trans. A Manual of Pathological Anatomy.) Pub. of Sydenham Society, Lond., 1849, 2.)

52 Spiegel, E. H.: "The centres of the vegetative nervous system." Bull. Johns Hopkins Hosp., 1932, 50, 237-252.

53 Underhill, F. P., and J. M. Freiheit: "Effect of pilocarpine and epinephrine in the production of specific lesions in the stomach of rabbits." Arch. of Path., 1928, 5, 411-428.

54 Westphal, K., and G. Katsch: "Das neurotische Ulcers duodeni." Mitt. a. d. grenzgeb. d. u. Chir., 1913, 26, 391-431.

55 Zondek, H., and A. Bier: Communication to Berliner Medizinische Gesellschaft, March 16, 1932, abstracted in Journ. Amer. Med. Assoc. 1932, 98, (May); and in Lancet, 1932, 1, 1009-1010.

The Massachusetts Medical Society

ONE HUNDRED AND FIFTY-FIRST ANNIVERSARY DINNER*

PRESIDING: Dr. Halbert G. Stetson, President.

PRESIDENT STETSON: *Ladies and Gentlemen,* please come to order.

The first announcement I desire to make will be one of great interest to all. Nine hundred and forty-two members have registered at this annual meeting. This is an unusually large number, and much credit is due to the Committee of Arrangements and the section officers for providing what seems to have been an excellent program.

We have as a guest from Oxford a man whom we are all particularly proud to honor. That is Mr. G. R. Girdlestone, a Fellow of the Royal College of Surgeons and head of the Wingfield Hospital at Oxford, who has devoted himself to the care of crippled children. We should be very glad to have a word from Mr. Girdlestone.

MR. GIRDLESTONE

Mr. President, Ladies and Gentlemen, I was told beforehand that I was going to be asked to say a word, but I naturally thought I was going to speak at the end of the exercises, when you would have been put to sleep by the previous speakers, presumably. Otherwise, I should have been much too shy to speak, but I do appreciate this very great honor your President has thrust upon me,—first of all the great honor of being asked to come here; secondly, the great honor of being asked to speak as a representative, in a very humble way, of another old institution. Your Society is old and famous, and my city and my university are also old and famous, so I feel we have a great deal in common, and it enables me particularly to appreciate the honor you have done me and my Alma Mater.

While I like to deceive myself that it is my university and my country that you are honoring, I nevertheless know that the real reason is both nearer and dearer to you, and that I am here and honored in this way, not for my own sake, or for Oxford's sake, but for my host's, Dr. Osgood's, sake, who is near and dear to all, and it is the attraction of his personality that brought me here.

I have enjoyed being here these few days, and I would like to stay here very much longer. I appreciate your countryside enormously, your hospitals and the surgery that I have seen, and all the work I have witnessed, and I appreciate tremendously the spirit in which I see you doing it, the spirit of coöperation and fellowship, everything being done for the advancement of knowledge and the good of the patient, so that I may carry back with me a very happy and delightful memory of a series of events.

I thank you very much indeed for asking me to come, and for asking me to speak.

President Stetson: We have another guest this evening, Dr. J. M. Baker, State Health Officer of Alabama, a notable physician and health officer and a man of outstanding prominence in his state. We should like to hear from Dr. Baker.

DR. J. M. BAKER

Mr. President, Ladies and Gentlemen, I assure you this is a very great pleasure. When I left Alabama about 10 days ago I had resolved that I would learn a few things about the work that I had recently taken up, after living practically all of my professional life, a life that has been spent in the active practice of surgery and medicine, and when I arrived in Boston I did not expect to be greeted by such a body as this. My good friend, Dr. Bigelow, kindly consented to give a little of his time to me in order that I might carry back to Alabama a few of the worthwhile things in public health, and I assure you I am making the best of my opportunities.

There is a question that confronts organized medicine today which I think is one about which every one of us should be thinking most seriously, and that is the relationship that should exist between public health workers and the organized profession. Coming into public health work as I have done from the practitioner's field, I think that I can see, probably as well as any public health worker, the problems that confront us, and it is a question of deep moment and concern to me. I feel that the problems, even though they loom large, are capable of solution if the leaders in public health work and organized medicine will come together with sincerity of purpose, because I believe there is no problem we cannot solve to the best interests of organized medicine and preserve the traditions and practices that we know belong to organized medicine, and at the same time serve the public as we should.

All practicing physicians should give serious consideration to those questions; and I wish to assure you that I have enjoyed being here among the members of probably the best and oldest organization in this country. While Alabama is not so large, yet we are firmly anchored so far as organization is concerned.

It may interest you to know that Alabama has the most peculiar, the most unique set-up

*Ballroom, Hotel Statler, Boston, Mass., Thursday, June 9, 1932, at 7 P. M.

for doing public health work of any state in the Union, or, for that matter, of any place in the world of which I have knowledge, and that is, organized medicine in the state constitutes, literally, the state board of health. The State Health Officer or Health Commissioner, the State Commission on Public Health, both in the state and in the county are entrusted to organize medicine. The Governor of our state has no more power in the selection of the State Health Officer than has any member in this audience. The entire administration is entrusted to organized medicine. Fortunately, organized medicine having been given this responsibility in public health work has so far done its job so acceptably that neither the legislature nor the people of the state would have it otherwise.

I thank you.

PRESIDENT STETSON: In the 136 years that the Massachusetts Medical Society has been holding annual dinners, at most of these meetings the state administrative department has been represented by someone from the State House, and this evening we are fortunate in having the Honorable Joseph A. Parks, recently appointed chairman of the Industrial Accident Board, and I am sure he has a message for you. I am not so sure he is going to say everything he knows: although we would like to hear all that he knows. Mr. Parks.

HONORABLE JOSEPH A. PARKS

Mr. Toastmaster, Invited Guests, and Members of the Massachusetts Medical Society, I am sure mine is a great honor tonight—first, to be called upon as a representative of Governor Ely, who would be glad to be here if it were not for other engagements. As you know, Governor Ely has just closed a very strenuous session of the Legislature—reluctantly. He would have liked to keep the members there to do the things he wanted to have done. He is a very industrious governor. He has the best interests of all the citizens of the Commonwealth irrespective of party at heart, and he wanted to help in the legislative problems; but governors cannot accomplish everything.

I think what he said to the committee who called upon him to get permission to prorogue—you know, they have to go to him to get permission—the words that he uttered I think it would be well for you to use in closing. He put them in this way—you may have read them, of course, but he said, "I thank you for the splendid things you did"—and then in his own charitable way, instead of giving them what they thought they were going to get, a good spanking, he said, "And I think I understand the things you did not do." And you and your convention here will do a lot of splendid things, and there will be some things that you will leave undone, naturally.

So I bring to you the greetings of Governor Ely, and of this good old Commonwealth which we all love so well, no matter what party we belong to. I have been troubled a great many times to decide just what party I belong to. Governor Ely's appointment of me as chairman of the Industrial Accident Board only last week makes the seventh appointment which I have received from the hands of the governors of Massachusetts. Four of those were Republican, and three Democratic, and they say I am a Democrat.

When Dr. O'Brien called up my office and invited me here tonight, he first talked to my secretary, and I was flattered by the message which she gave me—that the doctor was very anxious to get in touch with me, that the medical men were very proud of the appointment of Governor Ely, and they wanted to honor me at their annual dinner. I called up Dr. O'Brien's office to verify it, and he repeated the same thing to me. He said it would be a great honor to have me at the head table and admonished me to say only a few words, and I am going to follow his request.

There are many things I should like to say. I did not expect when I came here tonight that I was going to have more honors showered upon me, because as I sit at the head table here I have on my left the President of the Massachusetts Medical Society, and on my right the President-Elect of the American Medical Association, Dr. Lewis. That, to me, is a great honor. It would be enough of an honor just to stand up here and look out into your faces, because I have always had a very profound respect and admiration for the physicians of this Commonwealth.

I have had in the 20 years of association with the Industrial Accident Board somewhat of a medical education, so much so that, without knowing how it had grown on me, at a convention of industrial accident boards, held in Halifax, Nova Scotia, some years ago, when Ex-Governor Cox was in office, he appointed me to represent the Commonwealth, and I was delegated to read a paper on the rehabilitation of injured workmen. It was not a very great task for me and, because my job is a busy one, I had to write it up on the fly. I got it together, went up to Nova Scotia, and found that the entire program was conducted by medical men. The chairman was a doctor, and he introduced me as "Doctor" Parks. I thought that he knew I was not a doctor, and he was just trying to be courteous. When it was all over and the doctors had read their papers, he complimented "Doctor" Parks, and said his was the best medical paper read that day. I was a little surprised later to be asked for permission to have it printed in the Medical Association Journal, and I had so many requests for it that I finally came to the conclusion that I had actually contributed something of a medical nature.

My 20 years on the board, as I say to you, have caused me to have a profound—almost a reverent feeling for the profession. I am not in the

habit of misleading anyone nor afraid to tell men my estimate of them. I think the medical profession is the most honorable profession in the entire world. I am a member of the legal profession. I think it is a good second. I am proud of my membership although I have not been a member very long because of no opportunity in my younger days. I was quite advanced in years when I began to study law but I secured the degree. I enjoy meeting doctors in my work. I listen to their testimony and hear what they have done for some poor injured workman, for which they may not have been paid, which is unfortunate. I never met a doctor yet who looked upon his work as merely a road to wealth. They have to earn their living, they have to get little fees once in a while, but I always find them quite willing to help out and bring a man back to economic usefulness.

I could tell you many instances that have come to my notice in the last 20 years but it would take too long, but this is one which I should like to tell because it is a sample of what has made me admire the medical profession.

I recall nearly 20 years ago—the compensation act had been in effect only two or three years—the wife of a structural ironworker came to my office. She had been sent to see if something could not be done for her husband. She said, "Mr. Parks, my husband is lying in bed. The attending physician says nothing can be done for him." He had a fractured spine, and the lower parts were paralyzed. She had no complaint to make about that. She had to clean him up two or three times a day but she was not complaining. She said, "I want him back," and with a sob in her voice, she said, "Can't you do something to give him back to me? He is going to die. Why doesn't someone do something for him—please?" She said, "We have five little children. The oldest is seven years of age."

About that time I knew there was a doctor performing operations on the spine. I think it was a comparatively new field at that time. It is where you take a piece of shinbone and graft it into the spine. I asked the insurance company if they would not have some doctor try that operation, and, to their credit, they got this doctor who was doing this work, and he did a wonderful job.

I had the pleasure of seeing that man come up to my office, on crutches the first time, then with a cane, and then without the cane and the next time I saw that man—he went back to work within six months—he was testifying before me as a witness in the claim of another injured workman. He was the superintendent for his employer. He had gone back to work and had attended to his work so faithfully, using his head a little more than he did before because he was still weak in the back, but he was noticed by his employer and became superintendent within four years.

If you will only analyze that, you will realize what a blessing it was! You brought that man back to usefulness. You gave him back to his wife and five little "kiddies". They were able to go to school. They were able to go to high school, and perhaps some of those little boys are attending some medical school to become doctors themselves. I have not kept track of them but that is entirely possible, and it was all brought about by a physician, by one of your number. I do not see him here tonight so I can speak freely about him.

I do not see many that I have come in contact with but there are a few familiar faces. Dr. Riemer, who is a great help, is before me, and Dr. John Adams, whom I see frequently at hearings on cases; also Dr. Scannell and Dr. O'Brien, the roentgenologist.

When I think about Dr. O'Brien, I recall a recent experience. I dislike to tell about this because it is perhaps telling about another type of medical man we have in this Commonwealth. I was having a hearing the other day, and a doctor clearly went beyond the bounds of the ethics of your profession, and I told him in no uncertain words that he was a disgrace to the most honorable profession that I knew, and it left a stench in my nostrils. I was disgusted because of the love and respect I have for your profession. I told him that that type of man was a disgrace to you, and further that his kind ought to be eliminated from the profession.

At the next hearing, thank God! one of your men who is here tonight came up to testify, and his very presence cleared that stench that pervaded the room. He is the type that represents the majority of the medical profession. There are only a few like the first example but there are more like Dr. O'Brien, who testified, and I made the remark that Dr. O'Brien was the type that was an honor to the profession and the other was a disgrace.

In talking with Dr. Stetson, he tells me that you are interested in keeping your profession clean. I know you are. You should fight for that profession just as you would fight for your own good name and character. I know I fight for myself. If anyone wants to have a little scrap with me all he has got to do is attack my good name or character, and I am ready to scrap. So that you men in your profession want to guard it and keep it sacred and honorable, as it is. Do not let the other fellows stay in and do these things that are discreditable.

Now I want to tell you and have you take back to your respective Societies in this Commonwealth the fact that the new Chairman of the Industrial Accident Board admires your profession, and that if there is anything he can do to advance your cause he intends to do it. You should be interested in legislation that is being enacted year after year concerning your profession. Sometimes there are bills affecting your profession connected with our work. We have nothing to do with them. We are creatures of

the legislature, and whatever the legislature passes we have to abide by. We cannot inject our own personal opinions into our work.

Now I find that I have said many things I wanted to say, but I have not time to say more because I am not the chief speaker, but I want to say to your Society—I am stopping right here, right in the middle—God-speed. I hope your convention will be very, very successful. I hope that in the coming years, if we ask you as medical men to give us a little help, if I ask you as Chairman of our Board to help us out in the better administration of the duties of my office, you will not be reluctant to come forward. I want to thank everybody here, particularly the President, for inviting me. I am glad to be here, and I wish you every success.

PRESIDENT STETSON: Our next speaker of the evening is Dr. Charles F. Wilinsky. He needs no introduction. He is one of the Deputy Commissioners of Public Health of Boston, and is Director of the Beth Israel Hospital. We shall be glad to hear from Dr. Wilinsky.

DR. CHARLES F. WILINSKY

Mr. President, Distinguished Guests, Ladies and Gentlemen, when one has been privileged because of opportunity and because of accident to participate in a communal attempt over a period of years for the promotion of health, he is indeed in distinguished company, and it is a privilege to walk down that road with a profession as rich in tradition as Mr. Parks has so very ably pointed out.

It is indeed a pleasure for me to take advantage of this opportunity to extend to you the greetings of the City, to tell you how honored we feel in your selection of Boston as your meeting place, and how much richer we feel because of your presence.

It is particularly fitting, as I see it, to pay tribute today, with gloom rampant and pessimism in the air, with social consciousness leading those who have either real or imaginary poverty to attack the medical profession, carrying out its idealisms and altruistic motives, rendering medical care at all times and particularly to the under-privileged who need it so much at the present moment.

As I see it, the objective of the medical profession is the promotion of health and the preservation of life. The objective of those who are entrusted with certain responsibilities for the promotion of public health is the realization of this very sane, earnest approach and hope of the medical profession, the preservation of life. And so, only to skeptics, or those who think rather superficially, is there any opinion that there is cleavage between those two very necessary and distinct elements of the medical profession and the profession engaged in the promotion of public health. We have been fortunate in Boston in the fact that we have been privileged to lean upon the members of the Massachusetts Medical Society who have been exceedingly helpful in the advancement of our public health structure—Dr. Bartol, Dr. Shattuck, Dr. Smith, Dr. O'Brien, and others who have been most able supporters of the attempt of the municipality to set up a program which had for its objective the conservation of life.

We all realize that as the character of our population changes, with urban growth and overcrowding, there is found necessarily a great need for adequate public health programs. From whom shall the lay people receive it except from the members of the medical profession? Near-sighted indeed is the health officer who fails to realize that his ultimate objective cannot be reached unless he obtains not only the coöperation but also the active participation of the rank and file of the medical profession. And so I say that if there is anything which organizations of this nature can sponsor, if there is anything which state societies can do or may do, it is to exert every possible influence in the direction of a better understanding between the so-called public health service or organization and the rank and file of the medical profession.

We are fortunate indeed in Boston to have, in a marked measure, the support of the doctors of our community. It is because of this support, it is because of their participation in the purpose which motivates us in the public health service that there has been such progress as has been made. It was not so long ago that we expended approximately $200,000 to $250,000 per annum for public health in our city, a per capita of about 35 cents. In spite of the challenge of wastefulness, in spite of the possible inference by narrow-minded and near-sighted individuals that it may be waste, we are proud of the fact that we expended in Boston in 1931 approximately $1,400,000 for public health, or almost $2 per capita, and in this necessary expenditure for the protection of life and the promotion of health I think we are all grateful to the medical profession.

So may I close as I began by extending to you our greetings, by expressing our appreciation of your presence, and by asking for the support of every physician in Boston in our public health program—nay, going further than that and asking for your participation, and assuring you that I believe the philosopher could have meant no one more than you when he said that in nothing does the human being so nearly approach the gods as in his willingness to serve mankind.

PRESIDENT STETSON: The next speaker of the evening hardly needs an introduction. He is a man who has had broad experience as a clinician, and a great deal of experience as a teacher, who in his later years has taken on the burdens of administration to some extent, and who in the last month was made President-Elect of the American Medical Association. I wish to introduce to you Dr. Dean Lewis of Baltimore, Maryland.

Dr. Dean Lewis

Mr. President, and Members of the Massachusetts Medical Society, I do not know that I need to explain why I am here. I am here for one reason—because Mr. Stetson invited me. Another reason is I have several friends in the Massachusetts Medical Society who have appeared on the same circuit with me for a number of years, and I want to come back and meet them again because my acquaintance has doubled within the last few years.

I am in somewhat of a delicate position because having been President-Elect of the American Medical Association only four weeks, I have not been notified yet as to what my duties are. I suppose one of my main duties is to act as a sort of liaison officer between the component societies of the American Medical Association and the Board of Trustees who transact the business.

I am here tonight reminded of the story of a family that had twin boys. The mother of these twins was a Baptist and the father was not. For several years they had a discussion at the breakfast table every morning about these twins. The mother said, "Father, we ought to have these twins baptized." The father could not see it, and the argument went on for about three years, and got a little acrimonious at times, and one morning the mother started this subject again, and she said, "Father, we ought to have these twins baptized." He said, "All right, Mother, baptize John and use the other boy as a control." So this is my first appearance before a State Medical Society in the office to which I have been elected, and I am going to use you as a control.

I have looked up the addresses of the presidents of the American Medical Association for quite a number of years past, and find that the content of those addresses depends entirely upon the office which these men hold in their profession. Dr. Vaughn talked about preventive medicine in relation to medicine and community health. Dr. Knowlton dilated upon the glories of the medical profession and ended his address on medical teaching. About 1918 there was a great change in the tone of the address because the medical profession at that time was mobilized for war, and they did a good job. They made some mistakes, and these mistakes may have been costly, but they were rectified very early.

For instance, the medical profession had been at peace for a number of years and had forgotten the right treatment of war wounds, which in this war had to be changed because of the introduction of high explosives, and the armies were fighting over soil which had been highly fertilized for a number of years and contained bacterial organisms. We had to go back 100 years and introduce the treatment of war wounds inaugurated in 1795 which was popularized by Napoleon's wars. That treatment was revised, and I speak of this now because I think we are now paying the medical bill of peace, and I think the medical profession has to be vitally interested in the things that are going on at the present time.

Any of us who served in the evacuation or front-line hospitals have a very definite idea about the morale of the enlisted men. It was the most wonderful thing I have ever seen. On the 15th of July, 1918, I went to an evacuation hospital about 10 miles south of Chateau-Thierry, and when I got there I supposed all would be confusion. There must have been 500 men, without a groan, on litters about this hospital, some of them sleeping, and I will cite some of these cases just to show their morale. You have seen them all, those of you who went over.

About the second day I was operating there was a fine-looking boy by the name of Peterson brought in about noon. Peterson came from Tidioute, Pennsylvania, which is a queer name. While on service in the woods he was shelled that morning and had been struck in the abdomen by pieces of high explosive, and the omentum had prolapsed; he had several perforations of the bowels, some of which were closed and the bowel was resected. I went over to see Peterson following this, and he was always asleep. I think he slept for about 48 hours. Finally, one day I found him awake, and I said, "Peterson, how long have you been in the army?" "Well", he said, "I have been in it about two years now."

I said, "It could not be two years. We have not been at war that long."

"Oh, yes," he said, "I was down on the Mexican border."

"Well," I said, "what kind of a war was that?"

He said, "You know, that was just a sociable war."

Well, morale increased. One day I was in Chepy, a little village south of Chalôns, and was down in front of the tent when they brought in a load of wounded, and I saw a boy who had a one-pounder passed through his kneejoint, which was absolutely destroyed, the leg hanging solely by the skin. He was badly shot. I saw him that afternoon and again at night but he had not recovered from the shock. He was seen again the next morning but he was still in shock, and at about 2 o'clock he had not recovered. He had very definite evidence of gas gangrene, and I went to the man that had the first table in the operating stand, and I said, "I think you will have to take that boy's leg off at the thigh."

"Well," he said, "I do not know whether he will live."

They brought in this boy, and put him on

the operating table, and they took the leg off. The next morning he was comfortable, and about five days later they were ready to evacuate this large hospital, and he said, "Dr. Lewis, I would like to talk to you a minute."

I said, "All right, what is it you want?"

He said, "I want you to get all the nurses around my bed. Get them all around and let me look at them," and when they gathered he said, "The next time I see you nurses in Paris, I am going to take you out and spend all my money on you."

I say that is morale, and we used to talk about this morale in tents at night, what a tough thing it was to send them back into civil life. Within 24 hours after the Armistice was signed, this morale was gone. The food was bad, the beds were bad, and they would shoot a Frenchman on sight. I briefly cite that to indicate the state we are in at the present time. We have lost morale, and what brings morale up so quickly and what lets it down so quickly I do not know, but we want morale at the present time.

Well, this is the medical consequence of the war or the peace that they are in now, because if we made a few mistakes during the World War we have made a lot more now. No one has more regard for veterans than I have, and no one believes that the man who has been wounded and disabled should receive compensation more than I. Certain things have happened that I think are a little dangerous. For instance, an army service connected disability has been lengthened to 1930, and a lot of non-service connected disabilities are obesity and gout. If one becomes obese one has to go into training, diet and play 18 holes of golf, but if a veteran becomes obese he is compensated. That same thing applies to gout. England treated that situation well, and so did France, because in six months after the Armistice was signed no service disability was recognized, and after a year none was recognized in England, and I do not believe now, unless he has been shot at or been in danger, that a veteran ought to be compensated for service he rendered his country.

Another thing that the medical profession ought to be exceedingly interested in at the present time is the matter of building hospitals. We have a perfectly enormous building program to carry what they call the peak load in 1944. What is going to happen to those hospitals after the peak load has been carried is a question in my mind, because they are building them to stay, and they will have to have some bureaucrats to run these hospitals, and when they have the bureaucrats they will have to provide something for their use. Local pride has a great deal to do with this. For instance, not very long ago it was suggested that they have one of these hospitals in Cincinnati, and 200 citizens of Cincinnati went to Washington and lobbied for a hospital—and when it comes to lobbying, the doctors are not there.

I talked to a Senator the other night about these hospitals and said, "Have you ever thought about the difficulty of staffing these hospitals?" He said it had never entered his mind. They regard a hospital as so much brick and mortar, and never think about the staff, and it is going to be one of the most difficult things in the world to staff these hospitals and give these veterans efficient medical service. We have at the present time enough empty beds in civilian hospitals, and all of them are running with a deficit. In Baltimore the other day we had 1400 charity cases in private hospitals with charitable hospital cards, and we cannot get money from the community to support these beds, and yet we are taking people into them all the time and feeding them. That is a very serious matter in times of depression, and this is something the medical profession ought to take into consideration—communal aid.

Another thing which is coming out was brought back to me very forcefully today by the death of Dr. Keen. That is the matter of anti-vivisection. Dr. Keen was one of the keenest fighters against the proponents of anti-vivisection we have ever had in this country, and the arguments he presented some years ago had a great deal to do with the prevention of the introduction of some dog bills in this legislature.

They are asking now to inspect the laboratories. I should be very glad indeed to have anyone that is competent to judge inspect our laboratory, but I would object very seriously to having somebody come into the laboratory to inspect it unless they have some judgment and ability to decide what is right.

I said something about lobbying. So far as I can make out, doctors are poor lobbyists. I hate the word "lobby", but I think we have to lobby, and the only way I know we can do it is to be personal lobbyists. Every one of us knows somebody in the legislature, somebody who has some political influence, and we have to become personal lobbyists. For some reason or other—I do not know definitely what—doctors are always regarded as a little selfish—they are not altruistic, —their motives are misinterpreted—and on this question of misinterpretation I will tell you how easily it may appear.

When Dr. Welch first went to Baltimore the hospital and the medical school were in a state of depression. They had very little human material on which they could rely, so Dr. Welch became very much interested in hog cholera. One hot day in August he got word from a farmer on the eastern shore of Maryland that five of his hogs had died, but he could not get in contact with Dr. Welch, so he buried them. Dr. Welch said, "All right, I will come over and examine those hogs." So he went over on the eastern

shore on this very hot day and went to work unearthing these hogs. There were two old colored men watching him as he worked unearthing them, and as the carcass of the first hog was brought to light, one of them said, "Mose, ain't it queer what a white man will do for money?"

Then another matter is the high cost of medical care. I rather speak of the high cost of hospitalization. There are certain things that have been very definite and outstanding in medical care in the last few years. In the first place, everything else has been high. That is the primary reason, because all the supplies we have had to order have been high. Another reason why hospital medical care is high is because people demand it. Obviously, anyone that is sick is going to be given the best care in the world if he has to mortgage the house, and any doctor knows he has often talked to the patient and said "You can get this satisfactory accommodation for $5 a day"—but the patient will take the $40 room just the same and have two nurses, when he can get along with one.

Another thing about which I think the medical profession is wrong is this, and I think too the medical schools are a little wrong: We come to the point where we have to make every examination in the world. Medical students stand for self-protection for fear they will have a little trouble with the chief if anything is neglected. But it ought to be the duty of the clinician to make by physical examination as good a diagnosis as he can, and judge the other diagnostic methods only when they are necessary, and I think if we could reduce the number of examinations we would do very much better.

There is one other thing I should like to say, and this applies particularly to the American Medical Association. During the last 25 or 30 years we have had states make very stringent regulations about state board examinations, and about curricula, and I think it is about time to relax a little bit. For instance, in the Hopkins Hospital I think Dr. Williams conducted one of the best courses in obstetrics I have ever known, but despite the excellence of that course no one could practice in Pennsylvania until he put in a certain number of hours in a hospital, and because one did not have exactly the number of hours they required, they would not let him take an examination even to determine whether he was competent to practice medicine.

Another thing the American Medical Association is partly to blame for is that they force state boards to determine the type of interneship a man should have, and they generally specify a rotating interneship of two years, six weeks on the eye, six weeks on the nose and throat, and three weeks in some other specialty, with the result they are not turning out a competent practitioner. I will take any of my boys for one year in continuous service in any department, and I think at the end of the one year in which he has been thoroughly grounded in that one subject, he will be a better practitioner of medicine than if he has a smattering of it. I think that is a very important thing. It is a question whether state boards are entirely satisfied with the type of interneship or hospitals selected for interneship which serve them.

You may all have read this editorial. I think the medical profession is making strides, but we have been a little bit backward about it. Mr. Parks has already told you that legislatures pass laws and the medical profession never knows a thing about them. That is one thing about the organization of the American Medical Association which is in need of improvement. They meet now and do not meet again until next year, and during the year a legislature may pass laws which are vitally interesting to the medical profession, and still the medical profession has not a chance to say a word about them. There is a little note of appreciation expressed once in a while. You have read this editorial probably, but I will take a moment more because I would like to read it again. It says:

> "Doctors are not better or brainier than other men. By and large, physicians are just as inclined to smoke too much, eat too much, drink too much as are the rest of us. They are not better sons, husbands, or fathers.
>
> "Yet if you balance the books of the events of the last 50 years and write down the lasting achievements of this half century, you will find the medical men not far from the top of your list.
>
> "Take that man Robert Koch, for example. He was an obscure physician practicing in a small town in eastern Germany fifty years ago. Then he did something of far more value to the human race than anything credited to Bismarck, the old Kaiser, or to any of the other powerful or illustrious men of his time.
>
> "We remember Koch now as the man who isolated the germ of tuberculosis. This was just one of his great accomplishments. Out of his laboratories established in Berlin after he had shown his power, came the discoveries of the causes of cholera, typhoid fever, diphtheria, erysipelas, tetanus, pneumonia, and other diseases.
>
> "When Koch began, life was almost as unsafe as it had been twenty centuries before, and the crowding of people into the growing cities intensified the danger. The death rate in Prussia was twice what it is today. In England and the United States sanitary conditions were little better. Tuberculosis was everywhere prevalent. It blighted the lives of children, of adolescents, and especially of young adults. It disrupted families, and spread poverty and misery everywhere.
>
> "Today we live in a totally different world. The infectious diseases have one after another

come under control. Cholera, typhoid fever, diphtheria, septicemia of childbirth, have either been entirely eliminated or have been largely checked.

"The death rate from tuberculosis is less than a quarter as high as it was fifty years ago. As a result of the new knowledge of disease, nearly 20 years have been added to the expectation of life.

"Inspiring as this conquest of disease, the saving of tens of millions of lives and the prevention of incalculable suffering, there is today an added meaning for us in this medical triumph.

"Disease was conquered when it was understood. The doctors demonstrated the practical value of science in attacking human problems.

"We have scarcely begun to use science in our efforts to deal with our social and economic difficulties. They are now handled as disease was treated in the years before scientific inquiry blazed the road to understanding. Medicine, of course, hasn't learned all there is to know, but doctors have learned to use science.

"We shall come to that. The politician and the business man of the future will have to adapt the methods of science to social and economic affairs. Prohibition, business organizations, the various issues of finance and trade, periods of depression and of prosperity —all these cry aloud for the kind of dispassionate inquiry, understanding and treatment which science renders possible.

"Millions are alive and well today because a half-century ago intelligent physicians substituted science for tradition and opinion. Other millions of the future will look back to the pioneers who first applied science to our social problems, and who prove that safety exists in sound understanding."

PRESIDENT STETSON: It happens in the daily walks of life that the doctor must come in contact with the lawyer. I sometimes think that the lawyer must come in contact with the doctor to a greater degree than the opposite. The Massachusetts Medical Society is continually referring legal problems to the attorney, and now we have with us Mr. Robert G. Dodge, who has advised us in many legal probems. We will hear from Mr. Dodge.

ROBERT G. DODGE, ESQ.

Mr. President, Ladies and Gentlemen, the lawyer does meet the doctor often, and he is always glad to meet him, but who is ever glad to have contact with the lawyer?

The letter of your President inviting me to come tonight to speak contained no indication of the topic on which he wished me to speak. After extending the courteous invitation he simply added, "This is the 151st Annual Dinner of the Society, which was founded 151 years ago." So I suppose I am expected to congratulate you upon your long and honorable career at your great age, which I gladly do.

I was interested in what the President-Elect of the American Medical Association has just said in speaking of the great advances in the medical profession in recent years. I wish as much could be said about the legal profession. In the 151 years of your history and during the early part of that period there were tremendous advances in the profession of the law and in methods of administering justice, in England particularly. In the last 50 years I am sorry to say that one might question whether any great advance has been made. However, what you are interested in now is the present, not the early days of the medical profession or of your Society, but the present time.

The very delightful English accent of the gentleman sitting at my right reminded me of that other Englishman who came to this country and was sitting down at his first meal in a New York hotel, and observing a dark liquid in his soup plate which he did not recognize, said to the waiter, "What is that?" The waiter replied, "That is bean soup." "I don't care what it has been," he said; "I want to know what it is now."

What you are interested in is the present state of the legal department of your Society. It happens that during the past year two or three matters of some interest have arisen in the legal department which I thought you might wish to hear.

In the first place, we succeeded at last after a long effort in getting reliable statistics from the two insurance companies which insure you against liability in malpractice cases, and after combining those statistics in one statement so that no one could tell which company was doing the larger business, we were allowed to give them some publicity. You will be glad to know that, in spite of the impression that malpractice cases are gradually increasing in number, and that doctors are being treated more severely at the hands of juries, there is nothing in the statistics of those two insurance companies to indicate that that is a fact. It was quite interesting, and I copied down just a few of those figures.

It is interesting to note that, apparently, there were more claims against doctors in 1927 than in 1930 and many more than in 1931. The general tendency seems to be downward in a number of cases. It was also very interesting to me to observe that which I have always felt to be the fact—that juries do not look with favor, ordinarily speaking, upon claims against doctors. In the 71 cases that have been tried by those two insurance companies—they try most of them in this state—in the past five years, only nine resulted in verdicts for the plaintiff. The verdicts for the defendant are not advertised widely, but every bad verdict against a doctor is

widely advertised, so that it is interesting to note that only nine cases out of 71 actually tried have resulted in verdicts for the plaintiff.

The cases which I have as your counsel are only those of the doctors who are not insured, and I think there are comparatively few of them. They are getting fewer and fewer year by year because the cases that come into my office are gradually decreasing, and if I had to rely upon my emoluments as counsel for your Society, the wolf would not be kept away from the door. Only four cases have come in to me in the last two years.

During the many years that I have had these cases I have been very much impressed by the fact that most of them were of such a trivial character. Many of them never come to trial. Some are dropped and for one reason or another they do not come to trial, and in all that time only two cases of serious character where the physician was very obviously to blame have come into my office.

One of them was the case of a doctor inexperienced in handling the x-ray, who placed an improper guard over a girl's head, and then administered this ray in such a way that she was very severely burned all around the outside of the plate or whatever it is that you use in the application. It was obviously a case of inexperience and negligence, and we settled that case with the approval of your office for a substantial sum.

The other case was an extremely sad one where a doctor, also with little experience, in treating the eyes administered to the patient exactly the wrong remedy, and total blindness resulted very quickly. It was a very sad case and could not be settled because there seemed to be no means, no money with which to settle it. Finally it went to a jury, and there was a verdict, not at all too high, of $10,000 against him.

In every other case which we have had in our office, and there have been a good many of them over the years, I recall no other that was serious or where I thought the doctor was at all blameworthy, and juries have thought likewise.

Another point which has come to our attention this year is the scope of the insurance policy which you doctors can get. It is not fully protective for the reason that the insurance department construes the law as not entitling it to defend a doctor who is sued civilly in a case involving a possible element of criminality. That is a very unfortunate position to place the doctor in because there are many cases where the civil claim, as for assault or alleged false imprisonment brought, perhaps, against the proprietor or head of a sanatorium, although based only upon the alleged civil wrong does involve a possible element of criminality, and if the doctor is wrong there is an element of criminality as in any case where a doctor is charged with assault, operating without consent or something of that sort. I think there is a list of cases of that sort which may involve that element of criminality, assault, slander or libel, undue familiarity, anesthesia hallucination, personal restraint, malicious prosecution, cases for example where a doctor is charged with slander or libel for giving a wrong diagnosis in a case and attributing some disease to a man who sues for libel or slander.

Of course, the law ought to entitle the doctor to be defended. No one would suggest that if he is convicted of any criminal offense, the penalty should be paid by the insurance company. That would be against public policy. But there is no reason, I believe, why the doctor should not be defended by the insurance company, and why, until he is found to be guilty, he should not have the expense of defense covered by the insurance. That will apparently require a change in the law. The insurance companies are somewhat interested in it; I am sure all the doctors are interested in it; and I submit that for your consideration as possibly a matter which should be brought to the attention of the legislature.

One other matter and only one. A decision of the Supreme Court during the past year has made manifest what we in the legal profession and you in the medical profession did not know before, and that is that if a doctor loses his right to practice his profession by edict of the Board of Registration in Medicine, he has no right of appeal to a judicial tribunal. Of course you know that he has no full right of appeal but a very limited question can be presented to any court. Now when you consider the extreme severity of that penalty, the taking away of his means of livelihood from a member of your profession, it would seem to be obvious that at least one judicial trial should be guaranteed to the doctor. You know, of course, that lawyers are much worse men than doctors. They are. Well, I wish you could compare your own code of medical ethics with the code of legal ethics which lawyers are supposed to live up to. You have in your pamphlet seven little paragraphs of platitudes on what a doctor should be and do. Fundamental morals are all that is involved. The lawyers' code of ethics in the American Bar Association and our local associations contains 16 pages of closely printed material covering all the different relations of the lawyer to his brother lawyer, to the opposing client, to his own client, to the court, and, really, questions of ethics, what is decent conduct, are arising constantly in the offices of all lawyers.

Now the lawyers transgress those principles of ethics and rights constantly. You have no idea of the amount of consideration the Bar Association in the City of Boston is giving at

all times to lawyers who have transgressed the rules and done something wrong. Last year more than 700 complaints against lawyers were submitted to the secretary of the Grievance Committee of the Bar Association of the City of Boston. They have a paid secretary on the job all the time. He receives complaints, many of them groundless, many of them serious, and that Grievance Committee is sitting in Boston every Thursday afternoon to hear cases against lawyers. The lawyer is given a full and fair hearing before that Committee, but it cannot disbar the lawyer. All it can do is submit the matter to the court, and the court then hears the case anew and passes upon the evidence and administers justice.

With the doctor it is different. In spite of the fact that wrongdoing on the part of the doctor is so much less in extent, it is very much easier for the doctor to be deprived of his right to practice than the lawyer. All that the doctor can do is to go before the state board of registration, composed of busy men unaccustomed to judicial duties, who hear the evidence, and their edict is final provided they have proceeded in accordance with law and have given him a fair hearing.

Now I say that because the Supreme Court decided this year for the first time that the statutory provisions providing for an application to the court, and giving the court the right to reverse the decision of the board if plainly wrong have now been construed to mean that the only question submitted to the court is whether the board proceeded according to law and gave a fair hearing, and if they did, the credibility of the witnesses and everything of that sort is for them, and there is no opportunity for a member of your profession who is deprived of his right to practice his profession to have any hearing before a judicial tribunal.

I think that there ought to be a right of appeal, a broad right of appeal to the court, and, just as in the case of the lawyer who is condemned by a Grievance Committee of fellow lawyers, there ought to be a full and impartial hearing before an experienced judicial officer, and I submit that matter also for the consideration of the profession. It would require a simple modification of the statute to insure that right to the doctor.

PRESIDENT STETSON: We have another man famous in his own country, a man whom we are glad to see here this evening, and that is Dr. Felix J. Underwood, administrative officer of the Department of Health of the State of Mississippi. He is quite a distance from home, but I hope that he has enjoyed his evening. I am sure we shall enjoy hearing what he has to say. Dr. Underwood.

DR. FELIX J. UNDERWOOD

Mr. President, Members of the Massachusetts Medical Society, and Guests, I appreciate very much the invitation of Dr. Stetson to be here this evening. I feel that I am doubly honored. An invitation to be here would have been quite enough but then to be called upon to address this Society is another distinct honor which I appreciate very much.

I never try to make an after-dinner talk that I do not think of a story that I heard not long ago, perhaps quite a while ago, about a Roman teacher, an old professor who had displeased some Roman Emperor. Perhaps it was Nero in his fiddling days. The decree was that he was to be thrown to the lions, and on that day the Emperor and his court were there to see the fun. The old fellow was brought out and the keepers turned loose the very fierce lion that had been starved for many days for this special occasion. It seemed that the old teacher had a way of throwing his hand up when the students were a little noisy to quiet them. Perhaps that was the first Fascist salute. Anyway, he involuntarily threw up his hand when this lion advanced on him, and it worked. The lion stopped, and he stepped forward and whispered something in his ear. The lion immediately slunk back into his cage and no one could whip him out again. Finally the Emporer turned to one of his attendants in his box, and said, "Bring him over here." When the man appeared in front of him, Nero said, "Now, I will let you go free if you will tell me what you said to that lion." "All right, sir, I only said to the lion that after he had his dinner he would be expected to say a few words."

I enjoyed speaking very much until this time, and I feel like that lion. I feel like slinking back on my feet and staying there. I bring greetings to you from the Mississippi physicians. We number 1700 in Mississippi, with a membership of about 1100 in our Society, and our average attendance at an annual meeting is about 400 or 500.

I shall go back to them and make reports just as though I were a fraternal delegate and tell them about this meeting and about you.

I want to say to you that Dr. Baker said something a few moments ago about our problems in common, and how we might work them out. I know that we have leadership in the field of medicine and in public health. I am rather proud to rub elbows constantly, not only with the leaders in the field of curative medicine, but in the field of public health. There must be a great deal to public health when a man like Baker of Alabama would desert a very lucrative surgical practice and go into public health. He is about a middle-aged fellow as you observed by looking at him, and when men like Bean of Tennessee, Draper of Virginia, Reilly of Maryland, Perrin of New York, and George Bigelow of Massachusetts devote their lives to public health, there

must be something to it. I am rather proud of the company I keep.

Health officers of the country over hold you in high regard and very high esteem because of their frequent association with George Bigelow. We think of him as representing medicine in Massachusetts. George is a physician first and a health officer next, he is both, and I know that he has at heart the best interests of the profession. He is continually thinking of the best interests of the profession here and over the country. I have found, you know, a rare combination in this man, that of sparkling, refreshing humor and lots of gray matter. You do not see them combined very often. I have always found him seriously humorous and humorously serious, but the humor is always there. I am glad of an opportunity to come to his state and visit him.

This is my first trip to Boston, and I expect to take back with me to Mississippi a great deal, because I think Massachusetts has a splendid setup, and I know that you realize that fact. It is a strange thing to me that, of the 41 states—and it is not strange, either, when I think about it—there is just one where a study of lobar pneumonia could be made, and not let George do it,—but George did it.

I am glad to be with you on the occasion of your 151st birthday, where you have gathered to discuss new developments and new methods of practice. Dr. Heffernan's report on your study of lobar pneumonia was very much worthwhile. There is no way of estimating the value of such a study and such a program. I think it is a splendid thing that the Commonwealth Fund of New York should interest itself to the point of being willing to finance such a study. Those people are not in the habit of throwing away funds. They are making investments and good ones at that. I hope and believe that this investment in this case will be one of the very best this organization has made. I think the work of the Commonwealth Fund of the Rockefeller Foundation deserves the sympathetic support of the medical profession all over this country.

We need help of this sort, we ought to have it, and we need it more in the South than you need it here. Mississippi is a poor state, a rural state, with very little wealth, and we need aid, and we try to use aid wisely.

I think there is need for permanent federal aid to public health, legitimate public health, and that aid should properly come, I believe, through the United States Public Health Service, through the proper channels. I do not see how a person could feel that it is all right to have federal aid for highways, rivers, harbors, education, agriculture and everything else, and not have federal aid in public health. There are those who do not believe in it but if one believes in federal aid at all, certainly we should have it for legitimate public health projects.

Public health, like scientific medicine, is here to stay. It does not make any difference what we think about it or try to do about it. No matter what cults say or do, both are here to stay,—public health especially.

The only time we get in trouble in Mississippi in a public health way is when we try to use untrained people to do the job. Sometimes we get in trouble there, but the only trouble we have had is where we have used untrained personnel to do the public health job. It is a specialty. And whatever distrust there may be between the practicing physician and the legitimate public health folks must go, and certainly we have the leadership in both fields to come to an understanding about these things and do what is right when all matters are considered, and all interests are given proper consideration. Then all will be well.

We are mutually dependent upon each other. How far could we go in the field of public health without the medical profession? I feel that those who are doing legitimate public health work in this country can be of considerable advantage to the profession in working side by side, and in making our cause a common one there will be no trouble. And there will be no state medicine. I think legitimate public health will move a long way toward keeping us out of state medicine in this country, and if we fight each other I think we will have state medicine.

As you know, there was a little misunderstanding in Mississippi recently between the public health forces and the medical profession. When we got together and talked it over we found out we were both pretty good fellows, and our respect for each other increased by leaps and bounds, and after looking into our program the profession there thought we were doing a pretty good job and that it was all right; but there had been considerable mistrust and whisperings about it for some time. It is all over now, and it is much better that we come together and discuss our affairs in a frank way, just look at each other in the eye, and talk it over and decide what we ought to do about it.

I am very much satisfied in the progress which I understand has been made here through the meetings between the Public Health Council of the Department of Health, and the Public Relations Committee of the State Society. I think it is a splendid thing to go into these matters and not blame each other and have trouble but simply sit down around the table and discuss it together. That is what will happen every time when men want to do right.

I did not think very well of the Public Relations Committee at first in Mississippi. We have a State Board of Health there selected by the medical profession, and every man on the State Board of Health is practicing medicine and surgery, one or the other or both, that is, general medicine or surgery or both, and I thought that the State Medical Society certainly could trust its own fellows that they had placed on the Board of Health. Then, in addition, we had a Committee on Public Policy and Legisla-

tion; but we found out after thinking the matter over and discussing these subjects carefully that the public relations committee, as is quite proper, is in position and will be in position in the different states to render a large service to public health as well as to the medical profession.

Speaking of the medical profession in this country, we may read or have read that the attitude of scientific medicine and legitimate public health, and vice versa, depends entirely on scientific medicine. Scientific medicine and legitimate public health should and will satisfy the people and protect the best interests of the profession and people alike. There is no doubt about that.

In our recent misunderstandings in Mississippi I had a good many letters which were signed and quite a few unsigned from cults, chiropractics, and others who wrote me. They were enjoying that scrap. Oh, it was a great thing for them to get the public health folks and the general practitioners of medicine in Mississippi, that is, the physicians, at loggerheads. It was great fun. But I had letters sent to my office from doctor friends of mine in several parts of the state saying practically the same thing about public health forces as they were saying to me about the doctors out there, trying to stir up trouble. So, as I say, we must stand together, united, and work these things out, and your Council on Public Health and Public Relations Committee doubtless will do that to the satisfaction of all. Just as our colonies in the early days had to unite, so the allied countries in the World War had to unite. If we are to be successful, this is no time to play to the gallery. Let us insist that constructive and courageous leadership come from the American Medical Association and the American Public Health Association, and I honestly believe that we have the leadership in both of those organizations to guide us successfully through these troublesome times.

I thank you.

PRESIDENT STETSON: As the last speaker of the evening, we now turn to the clergy. Reverend Dr. Arthur P. Pratt of Greenfield has something to say about his viewpoint of the doctor from the minister's standpoint.

REVEREND DR. ARTHUR P. PRATT

Mr. President, Ladies and Gentlemen, it is a pleasure to be invited to speak to you, and I assure you I appreciate the honor. May I be allowed to say that, glancing at the clock, it is the time my service usually begins on Sunday morning, and I assure you that we are always through at 11:45!

I have held pastorates for five, ten, and fifteen years, respectively, and in each of these pastorates it has so happened that among my dear, intimate friends, I might say my very intimate friends, have been physicians. It is so in Greenfield, where we are honored with our own Dr. Stetson, your President. I do not mean to say that these good friends, with whom I have on occasion the privilege of talking, or going fishing, or playing golf to my satisfaction when I was allowed to keep score, have always attended my church. They have not. They would smilingly tell me that they intended to practice while I preached. The remarks I want to make to you this evening, briefly, will be based on these 30 years of experience in the ministry.

I speak from the standpoint of the clergymen, and feel very strongly that sometimes the position of the clergyman is misunderstood by the physician. The clergyman will say he is concerned with the souls of men, and the physician with the bodies of men. May I say to you that I well know that you must deal with both. We were told in college that you must have a sound body to take care of your sound mind, and as a pastor I would reply, "As a man thinketh in his heart, so is he." A man clean in mind will be clean in body. I have no patience with the clergyman who talks the language of the soul only, for in my judgment men do not go to bed sinners and wake up saints. Goodness is a growth, and in all of the contacts that the clergyman will have in his parish he bears in mind that clean living is what he is after.

My experience with my fellow workers leads me to say that they are not altogether impracticable, and they are not altogether visionary. Though some may walk with their heads in the stars and among the clouds, their feet must be upon the earth. I believe so thoroughly that a man must be a good man that I have no patience whatsoever with any shortcut methods, whether it is in the ministry or in medicine. I am well aware of the fact that it is worth remembering day by day that the laws of health are the laws of God and are as important and as secure as the Ten Commandments.

Now, having said this, to give you my viewpoint as a clergyman I should like to call to your attention a part of the prayer of Dr. George A. Gordon at a dedication of the Harvard Medical buildings.

> "It has pleased Thee to make our existence of body and soul. It has pleased Thee to surround each part of our existence with infinite opportunity and infinite peril. Thou hast from the morning of time among all peoples called into being the sacred profession of the Healer. Thou hast renewed this profession in these latter days, in knowledge, in skill, in devotion, in vast hope. This we pray Thee, our Father, the members of this profession here and in all lands, friends of mothers and little children, the comfort of parents, the counsellors of youth, the strong defense and high power of all who toil for the physical well-being of man."

That is the way he prayed on the 25th of September, 1906, and I have read nothing finer since

that time to show the esteem and the regard in which I, and I know many of my brethren, hold you members of the medical profession. We feel so strongly on this subject that we crave your coöperation. No man can be a successful pastor without the intimacy of the physician. He must have the physician's friendship and confidence if he is to do efficient work in his parish.

I trust that you men are friendly to the pastors of your communities regardless of the communion of faith of any one of them. I trust that you appreciate the fact that we are striving to help men, women and youth. But while I know that you can preach a more effective lesson, I know that you by illustration and fact preach a stronger sermon by simply calling the attention of cause and effect than I could ever preach from my pulpit. While I appreciate that, I believe that there is work for the clergyman to perform, and we who have had some years' experience in this work know that it is slow work.

We are not fooled by the advertising of the papers. We know that men cannot become strong on something they buy for a dollar a bottle, any more than a girl can become beautiful on salve out of a 50 cent box. We know that it is a growth, paying strict attention and heed, and that is why we feel so strongly about coöperation between the men who talk about the cure of souls and the men who talk about the cure of bodies. The minister and the physician should be friends.

Physicians, I ask you to take, perhaps it may be necessary, a new view of the clergymen of your community. If you have thought them impracticable, be patient with them. There have been times when they felt they needed to be patient with you. There is a picture of what I consider a true physician in a statement of Dr. Osler, which I have copied—

> "A physician may possess the science of Harvey and the art of Sydenham, and yet there may be lacking in him those fine qualities of heart and head which count for so much in health."

That, as you know, simply means that you are to study the man as well as the disease; that you should know something about his life, his purposes, his ambitions, his disappointments and his failures in connection with his disease,—not that they are always interrelated, but I know that many times they are interrelated.

I have had people come into my office in the parish house to talk with me when they should have gone to the doctor, and I believe there are some people that have gone to the doctor who might well talk frankly with the clergyman. I am so thoroughly convinced of the principle in this matter that I feel that the greatest coöperation we clergymen can possibly have, will come from that realm in which the physician does his work, where he practices. The physician knows the necessity of clean living and after all, my friends, that is what we are trying to preach.

I have a parish house with an elaborate program. I realize that I wish to put before the boys and girls certain precepts, and I simply say, "Play the game, live clean, stand straight." And I want my physician friends to talk to my boys and girls, and I want the district nurse to come in and speak to the girls. I want them to know that you cannot divorce body and soul, or body, mind and spirit—if I may refer to our creed—to live and do with all your heart and all your mind and all your soul, and with all your strength. That is not all inclusive, but a religion that does not preach that I personally have little use for.

A man whose character I greatly admire made a wonderful contribution to the world when he turned the tide, as it were, and caused people to feel more kindly toward the sick and the unfortunate and the poor. He taught them to have more feeling, and that is what we need today, I believe, as much as we need anything—not that the medicine man lacks it, but sometimes I find that they might come a little closer to the people, understand them a little better and be as interested in them as they are in these diseases that are afflicting them.

I know the day has passed when the healer, the medicine man and the priest were one. I have no sympathy whatsoever with any so-called religious cult that would endeavor to take the place of the physician. It has seemed to me ridiculous. I do believe, however, that there is a great chance for you men to help us who are doing our best in these days when the tide is tremendously against the Church and tremendously against anything that says anything in the way of "Thou shalt not", or that suggests in any way that there are limits to what they let anybody do. We need that friendly coöperation with the clergy on the part of the physician. Of that I am very sure.

The physician's task is a great one, it is a noble one, and I almost hesitate to take the time after listening to these addresses tonight to add my word, and yet, you know, this is a wonderful opportunity for me. It is a wonderful privilege just to ask you men and women who are interested in this work to realize that we of the clergy want you to do some of our work in your way. We want you and we know that many of you do approach the man as a person as well as a case, where you can help restore his self-respect, restore his lost sense of manhood, restore his idealism in life and send him out a better man to face the world.

There are times when it might be very wise for that to be done. The physician's task is his own. He is a trained man. He is a scientific man, he is a man who is trained with great exactness, all of which I appreciate, and in these days of so much specializing I can understand the strain and stress under which you labor. Even so, my friends, forget not the human side. Forget not that many who come to you come from homes

where we of the Church have little hold, and there you, as I believe, are servants of the Most High, caring for the health of men, and can teach the lesson we are trying to teach—that cleanness of body goes with cleanness of mind, and if they want to have a happy life they must have a good life.

We may say that the physician of the type of the dear old school is practically gone, and we may say that the family physician is rare. Well, if he is, it is simply because the old family is rare. It is a fact that in many instances you have a hold on young people, I mean a grip where your personality can count enough to make a tremendous difference. To you there is that duty, that you should tell them what you must, and you will tell them because of what you find, and you should tell them the why of everything. I believe that is true, and I believe that the men of your profession are told that this is a confessional, and you hold it as a sacred trust. Is there not some way that you can be a coöperator in making those lives stronger and better—not but that I know you do, but I know there are some who, under the pressure of the business of their interests and their life work, forget?

I am here as a clergyman tonight, under the privilege of your good President, to tell you that from the viewpoint of at least one clergyman I consider the profession of medicine—the physician, the doctor—the greatest opportunity in the world. Why, you know, they used to talk about missions. Study missions today, and what have they become? My good friend, Dr. Enos Bigelow, and I have sat together on many a board. I know that today the medical men of the world have gone out not merely to teach by word of mouth but by kind acts. I know that on the streets where they have gone into special settlements, where they have gone forth to minister service and comfort to fellow men is where the tremendous difference is made, and if we can teach them Christianity, if we can teach them high idealisms, well and good, but it is for you men to teach them as you have opportunity to do it.

Oh, how many times I am told, "Why, you ministers don't know what you are talking about. You are simply preaching. You live in your studies. You get your ideas from books, and your heads are in the clouds." Well, it may be, but most of us have contacts where we know something about the stern realities of life. Most of us have contacts that you know about. We know some of the conditions that you know. It is my conviction, men of medicine, that you can attend to the cure of souls quite as much as to the cure of bodies. That is my appeal to you tonight.

You are with them from the beginning to the end. You usher them into the world; you are with them on their pilgrimage through life; you are with them when they pass out. Men, it is a high privilege. Hold to your idealisms. Help the men and the women, the boys, and the girls, who need your example, who need your friendship, who need your wise counsel, who need your splendid idealisms. Take that view as you go forth, and with a blessing minister to the soul as well as to the body. Be a minister as well as a physician. Study the man as well as the case, the problem as well as the disease, and with that helping hand I close with these words:—Life means just this, and God grant we may not miss its grave, great meaning. Life is to take the man so as to make the man worthy of being.

I thank you.

PRESIDENT STETSON: This ends the exercises of the evening. We stand adjourned.

THE RECENT SMALLPOX OUTBREAK IN FITCHBURG†

BY ROY F. FEEMSTER, M.D.,* GAYLORD W. ANDERSON, M.D.,* ROBERT F. BURNS, M.D.,* AND HENRY M. DE WOLFE, M.D.*

SMALLPOX in Massachusetts has fortunately become rare due to the enforcement of the law requiring vaccination as a prerequisite to public school attendance. In some instances private school authorities have insisted upon the same protection for the children under their supervision, thus increasing to a higher level the protection of the community. Occasionally, however, smallpox is introduced into a small group among whom a large per cent, due to various circumstances, have escaped vaccination. Such an instance occurred in Fitchburg early in 1932. Smallpox appeared among a group of foreign born residents living in a section separated from the rest of the city. The adults, immigrants from New Brunswick and other Canadian Provinces, had come to this country after school age, thus escaping the vaccination law, which applies only to public school children. For this reason there existed a large number of susceptible adults in addition to the usual group of preschool children.

†From the Fitchburg Board of Health and the Massachusetts Department of Public Health.

*Feemster — Assistant Director, Division of Communicable Diseases, Massachusetts Department of Public Health. Anderson—Director, Division of Communicable Diseases, Massachusetts Department of Public Health. Burns—Chairman, Board of Health in Fitchburg. DeWolfe—Epidemiologist, Division of Communicable Diseases, Massachusetts Department of Public Health. For records and addresses of authors see "This Week's Issue," page 95.

GENERAL STATEMENT WITH REGARD TO FITCHBURG

Fitchburg is an important manufacturing and business center of north central Massachusetts. The population is estimated to be just under 40,000, there having been some decrease since the 1930 census when the population was 40,692.

Thirty-six per cent of the population is foreign born. A large proportion of these are French Canadians from the Province of New Brunswick and there are also quite a number of Italians and Finns.

There is quite a concentration of the French Canadians in the portion of the city known as Cleghorn. It is almost a separate town of approximately 7,000 population. There are large numbers of shops and stores and no doubt these handle most of the business of the area because the town is separated from the rest of the city by a large hill. This would mean that the contacts between Cleghorn and the rest of the city might be considerably reduced, although some of the people worked in various parts of the city and some in Leominster. The Italian population is largely concentrated in the southeastern portion of the city. There are 38 physicians practicing in the city.

On January 12, 1932, it was discovered that there were a number of cases of smallpox in the city*. Investigation showed that there had been mild cases as far back as November, 1931, and only the fact that several quite severe cases had developed called attention to the situation. Since it was impossible to trace the contacts of all the cases, general vaccination was ordered.

VACCINATION PROGRAM

During the first three days the offices of the private physicians were so filled with those coming for vaccination that very few of them had time to help out in the public clinics. During this time the State Department of Public Health put a number of its staff at the disposal of the local Board in order to keep the public clinics open and to vaccinate immediately certain special groups such as the police, firemen, post office employees, street railway employees, laundry employees and the school children of Cleghorn. By the third day calls at the physicians' private offices had begun to decrease and they were able to give more time to vaccinating those in the public clinics, six of which were opened in the various parts of the city. By the end of the fifth day after the discovery of the cases, practically all the population of the city had been vaccinated or revaccinated.

The number of persons vaccinated by different agencies is shown in Table I.

TABLE I

NUMBER OF PERSONS VACCINATED

Physicians' private offices	11,725
Public clinics	19,421
Special clinics	2,766
Schools	6,029
Total	39,941

*Dr. E. H. Place, of the Boston City Hospital, was called in to verify the diagnosis in a number of the cases.

SUMMARY OF VACCINATION RECORDS

Records were kept as to the age, dates of previous vaccinations, and history of smallpox for all those vaccinated, both in the clinics and the doctors' offices. Analysis of these records shows that the population was fairly well protected so far as having a history of previous anti smallpox vaccination some time in their lives. This does not mean, of course, that all of them were thoroughly protected against smallpox, since there were 9,000 who had not been revaccinated in 30 years, and 10 years or more had elapsed since 24,000 had been vaccinated last. In addition to those who were not thoroughly protected by recent vaccination, 13.7 per cent (Table II) had never been vaccinated so that there was quite a large number of susceptible people in the city.

TABLE II

HISTORY OF PREVIOUS VACCINATION

Never vaccinated	5,457
Previously vaccinated	34,484
Total vaccinated	39,941
Per cent unvaccinated	13.7%

The per cent of the population previously vaccinated in each age group is shown in Table III. It will be noted that the least protected were those under school age and those past middle age. A large proportion of those unvaccinated in the 5-9 group were children of 5 and 6 who had not yet entered school.

TABLE III

PER CENT PREVIOUSLY VACCINATED IN EACH AGE GROUP

	Number at Each Age	Number Previously Vaccinated	Per Cent Previously Vaccinated
0-4	3142	66	2.1
5-9	4127	3454	83.9
10-14	4112	4067	99.0
15-19	4101	4027	98.2
20-29	6240	5970	95.7
30-39	5930	5571	94.0
40-49	5154	4827	93.8
50-59	3745	3451	92.2
60 and over	3187	2875	90.2
Unknown	203	176	86.9
Total	39,941	34,484	86.5

Since 56 out of the 60 cases occurred in the portion of Fitchburg known as Cleghorn, it is of interest to analyze these vaccination records to see if this distribution can be explained. As will be noted in Table IV, 30 per cent of those vaccinated in the Cleghorn public clinics had never been previously vaccinated, compared to 14 per cent in the five clinics in other portions of the city. The per cent unvaccinated in all six of the clinics was about 17 per cent, showing that those going to the public clinics were much more un-

protected than the population in general in which only 13.7 per cent were unvaccinated.

TABLE IV

HISTORY OF PREVIOUS VACCINATION

Public Clinics

	No Previous Vaccination	Previously Vaccinated	Per Cent Unvaccinated
Cleghorn	1,074	2,547	29.7
South Fitchburg	281	972	22.5
Water Street	338	1,616	17.3
Moran Square	402	2,441	14.2
West Fitchburg	200	1,409	12.4
City Hall	932	6,609	12.4
Total excluding Cleghorn	2,153	13,047	14.2
Total including Cleghorn	3,227	15,594	17.2

Table V shows the situation in the physicians' private offices. In Cleghorn 26.1 per cent of those going to private physicians had never been vaccinated in contrast to 13.4 per cent going to physicians in other portions of the city.

TABLE V

HISTORY OF PREVIOUS VACCINATION

Physicians' Private Offices

	No Previous Vaccination	Previously Vaccinated	Per Cent Unvaccinated
Physicians in Cleghorn	411	1,168	26.1
Physicians elsewhere in city	1,366	8,780	13.4
Total	1,777	9,948	15.2

Table VI shows the total number of persons vaccinated in Cleghorn compared with the total vaccinated in the rest of the city. This table does not represent the exact status in Cleghorn, however, for numbers of those who lived in the area were vaccinated in the City Hall Clinic and in various special clinics. Likewise persons living nearby came to the public clinic in Cleghorn in preference to going elsewhere. However, the table brings together those who were most likely to be in contact, since it is probable that they traded in Cleghorn stores if they came to the clinic there.

The schools were much better vaccinated than the figures in this table would seem to indicate, for a large number of those not previously vaccinated were pre-school children brought to the schools to be vaccinated. It will be noted that wage earners, of whom the special clinics were largely composed, were a better vaccinated group than the population in general.

ANALYSIS OF CASES

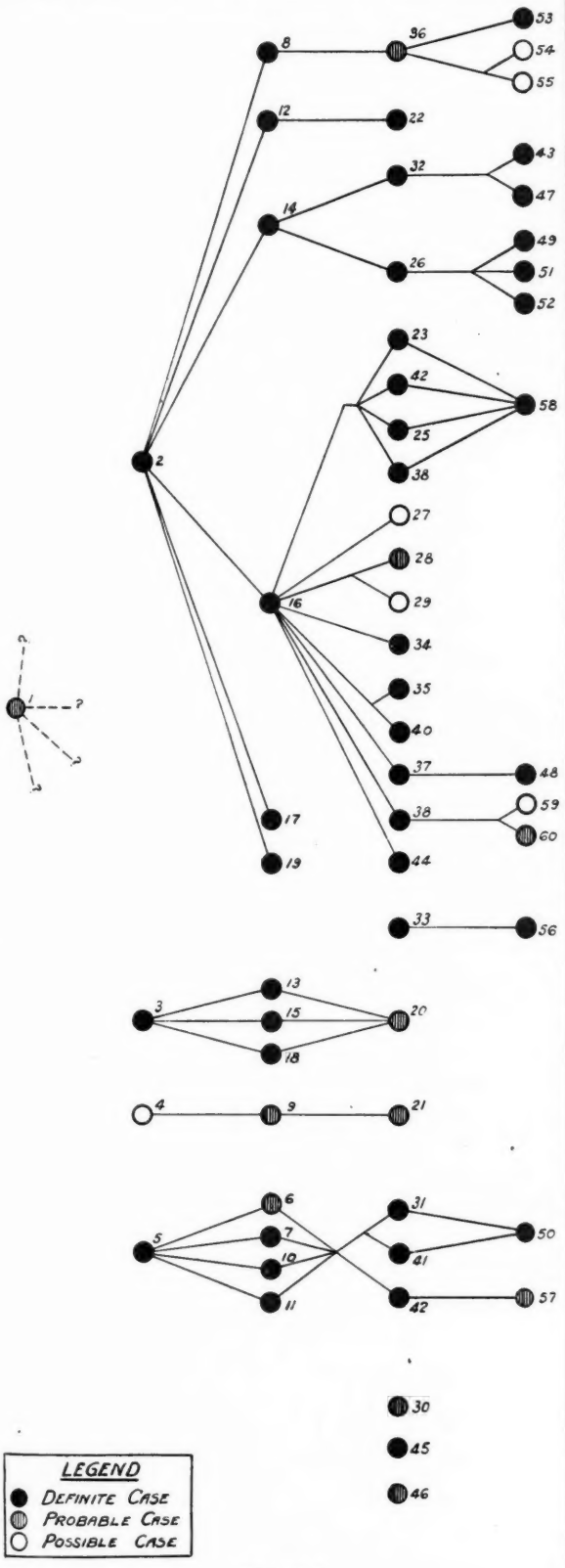
In following up of all the leads which were obtained in taking histories on those discovered to have smallpox about 60 more or less definite cases were investigated. Forty-four of these were without doubt smallpox, twenty-two of them being seen in the acute stage. The other twenty-two were not seen early but the history and the epidemiological facts, together with the result of subsequent vaccination, established the diagnosis as unquestionably smallpox. There were ten other cases that were probably smallpox but in each of these instances the evidence was either not sufficiently conclusive or the case had occurred so long ago that it could not be included among those positively diagnosed. There were six other cases quite possibly smallpox but certain confusing factors were present to throw some doubt upon the diagnosis. There were undoubtedly other cases which were not discovered. Only a house to house canvass would have revealed the entire number.

These 60 cases occurred by weeks as shown in Table VII. It will be observed that the first case occurred during the week ending October 31 and no other cases occurred until at least two weeks after that date, at which time four persons, claiming not to have had any contact with each other, came down with an eruption which was definitely smallpox in three cases and probably smallpox in the fourth. The first case is the only one of the five that gave a definite history of having been outside of Fitchburg during the two or three weeks before onset. Although he had not visited any place which is definitely known to have had any cases of smallpox, he had driven a truck into various cities and towns in Massachusetts and New Hampshire and had been in contact with numerous persons outside of Fitch-

TABLE VI

TOTAL VACCINATED IN CLEGHORN COMPARED WITH REMAINDER OF CITY

	Cleghorn			*Rest of City*		
	No Previous Vaccination	Previously Vaccinated	Per Cent Unvaccinated	No Previous Vaccination	Previously Vaccinated	Per Cent Unvaccinated
Physicians	411	1,168	26.1	1,366	8,780	13.5
Public clinics	1,087	2,572	29.8	2,233	13,529	14.2
Special clinics	57	320	15.3	220	2,169	9.2
Schools	22	1,564	1.4	108	4,335	2.5
	1,577	5,624	21.9	3,927	28,813	12.0



GRAPH I.
Probable effective contacts among cases of smallpox.

burg. It was also impossible to trace any direct contact between him and the next four cases which had an almost simultaneous date of onset about three weeks after he became sick, but he admitted that he felt well enough to attend church the Sunday after his eruption occurred and all four of the next cases attended the same church. Most of the succeeding cases can be traced back directly to one or another of these four cases, as shown in Graph I, which represents the contacts most probably responsible for the spread of the infection. It is impossible to trace definitely how the disease came into the city. It is likely that there were other cases which were not discovered, one of which would have explained the importation of the disease.

TABLE VII

OCCURRENCE OF CASES BY WEEKS

October	31	1	
November	7	none	
"	14	3	
"	21	1	
"	28	3	Note the increase immediately after Thanksgiving and Christmas, when contacts were increased.
December	5	4	
"	12	4	
"	19	2	
"	26	6	
January	2	13	
"	9	10	
"	16	5	
"	23	8	

No physician was called in by most of those who were ill in November and December, and there were several instances where the physician was called during the prodromal stage, when they were having "La Grippe", and was not called back later when the eruption broke out. This and the mildness of the earlier cases accounts for the delay in the recognition of the disease.

Thirty-six, or 60 per cent of the cases, occurred among males and twenty-four, or 40 per cent, occurred among females. The age distribution of the cases is shown in Table VIII.

TABLE VIII

AGE DISTRIBUTION OF SMALLPOX CASES

Age	Number	Per Cent
0-4	12	20.0
5-9	2	3.3
10-14	2	3.3
15-19	4	6.7
20-29	5	8.3
30-39	11	18.3
40-49	11	18.3
50-59	8	13.3
60 and over	5	8.3
	60	99.8

It will be noted that the majority of the cases occurred in the younger and older age groups. This is to be explained by the fact that in Cleghorn these were the least protected groups, being the pre-school children who had not yet

been vaccinated and the adults who had come in from Canada after school age.

It is very interesting to note that all of the 60 cases were of French-Canadian descent, being either immigrants or children of immigrants from Canada, over 90% being from the Province of New Brunswick. All had been in Massachusetts for some years, however.

Twenty-eight households had one or more of the 60 cases, thirty-one of them appearing to be primary and twenty-nine secondary. Table IX shows the ages of these. It will be noted that the disease was imported into the households by the unvaccinated adults who transmitted it to their unvaccinated children. This emphasizes the danger of having unvaccinated adults in a population. Their contacts are usually many times as numerous as those of children under six.

TABLE IX

AGES OF PRIMARY AND SECONDARY CASES

	Primary	Secondary
Under 5	2	10
5-19	1	7
19 and over	28	12
Total	31	29

ANALYSIS OF HOUSEHOLDS WHERE SMALLPOX OCCURRED

There were 28 households which had one or more cases of smallpox in this epidemic. There were 190 individuals in these households. Of this number, 99 were males and 91 females.

Of the 190 individuals, 120 were possibly immune, as shown in Table X, and 70 probably susceptible, as shown in Table XI. It is interesting to note that only 3 of the possibly immune individuals came down with smallpox, in each case being a person who had a history of not being vaccinated any time during the last 45 years. On the other hand, 57 of the 70 probably susceptible individuals came down with smallpox. Twelve persons among the 70 appeared to have had sufficient exposure to take the disease and all of the twelve developed primary takes when vaccinated 4 to 15 days after the apparent initial exposure, showing that they were probably susceptible, yet all escaped. The explanation probably is that none had received enough of the virus, which in this outbreak happened to be a mild type, to constitute an effective exposure.

Table XII shows the attack rate among the members of these households at various ages. It is interesting to note that nearly 50% of those under school age developed smallpox while only a small percentage of those in the school age and those who were probably vaccinated during the school period came down. On the other hand, over 50% of the individuals over 30 developed smallpox. These figures, of course, do not take into consideration whether or not the persons were vaccinated or unvaccinated.

Table XIII shows the attack rate among the unvaccinated individuals in these households. It will be seen from this table that smallpox attacked unvaccinated persons in about equal proportions no matter what their age was. The reason for the high incidence in the upper and lower years, therefore, is clearly seen to be the fact that the majority of the unprotected persons were in those age groups.

Table XIV shows the attack rate in various groups of population beginning with the total population of the city. It will be noted that the number attacked increases very rapidly as we select groups which were either more exposed or

TABLE X

CASES OF SMALLPOX AMONG PERSONS POSSIBLY IMMUNE IN HOUSEHOLDS WHERE SMALLPOX OCCURRED

	Number of Persons	Number of Cases of Smallpox	% Attacked
Previous smallpox	2	0	0.0
Previously vaccinated	114	3	2.6
Vaccinated within 3 days of exposure	4	0	0.0
	120	3	2.5

TABLE XI

CASES OF SMALLPOX AMONG PERSONS PROBABLY SUSCEPTIBLE IN HOUSEHOLDS WHERE SMALLPOX OCCURRED

	Number	Number of Cases of Smallpox	% Attacked
Never vaccinated	50	49	98.1
Vaccinated 4-7 days after apparent initial exposure	4	2	50.0
Vaccinated 8-15 days after apparent initial exposure	16	6	37.5
	70	57	81.5

TABLE XII

ATTACK RATE AT DIFFERENT AGES

Ages	Number of Persons	Number of Cases	Per Cent Attacked
0-4	26	12	46.0
5-9	25	2	8.0
10-14	22	2	9.1
15-19	22	4	18.2
20-29	30	5	16.7
30-39	22	11	50.0
40-49	18	11	61.0
50-59	15	8	53.0
60 and over	10	5	50.0
Total	190	60	31.6

more unprotected, 82% of the unprotected individuals living in the households where a case of smallpox occurred coming down with the disease.

TABLE XIII

ATTACK RATE AMONG UNVACCINATED

Ages	Number of Unvaccinated Persons	Number of Cases	% Attacked
0-4	18	13	72.3
5-9	2	2	100.0
10-14	2	2	100.0
15-19	4	4	100.0
20-29	7	5	71.5
30-39	13	10	77.0
40-49	12	11	91.8
50-59	7	6	81.0
60 and over	5	4	80.0
Total	70	57	81.5

TABLE XIV

ATTACK RATE IN VARIOUS GROUPS

	Population	Cases	Per Cent of Persons Taking Smallpox
Fitchburg	40,000	60	0.15
Cleghorn	7,200	56	0.78
Unvaccinated in Fitchburg	5,457	57	1.05
Unvaccinated in Cleghorn	1,577	53	3.36
Households with smallpox	190	60	31.60
Unvaccinated in households with smallpox	70	57	81.60

The influence of vaccination upon the chance of taking smallpox is clearly seen in Table XV where the number of cases among the vaccinated and the unvaccinated is converted into rates. Note that there was not a single case among the 29,558 individuals vaccinated some time within the last 40 years.

TABLE XV

INCIDENCE OF SMALLPOX AMONG VACCINATED AND UNVACCINATED

	Number of Persons	Number of Cases	Attacked per 100,000
Unvaccinated	5,457	57	1,048
Vaccinated over 40 years ago	4,926	3	61
Vaccinated during last 40 years	29,558	0	0

SUMMARY

1. Sixty cases of smallpox occurred in a city of 40,000 population.
2. All the cases occurred among immigrants or children of immigrants from Canada, all of them being of French extraction, and all but two from the Province of New Brunswick.
3. Fifty-six of the 60 cases occurred in Cleghorn, which is composed largely of French Canadian people. This part of the city was the least protected by previous vaccination, about 22% being unvaccinated.
4. Fifty-seven of the cases occurred in persons either unvaccinated or vaccinated more than 3 days after apparent initial exposure; only 3 cases occurred among vaccinated individuals and none of these had been vaccinated within the last 45 years.
5. Most of the cases occurred among those under 6 and over 30 years of age, the reason being that these were the groups in which the largest per cent of unprotected individuals occurred.
6. Smallpox was imported into the homes largely by unvaccinated adults. Most cases among children were secondary cases.
7. 40,000 people were vaccinated or revaccinated in about five days.

THE FIGHT ON YELLOW FEVER

The Public Health Service of the United States explains that this disease is by no means near extinction. It shows flare-ups in many lands and the vast reservoir of yellow fever is in West Africa. In addition the disease still persists in certain parts of Brazil and in 1929 it reappeared in Colombia. It is feared that by reason of rapid means of intercommunication between countries in which there are endemic centres that the disease is likely to show activity in unusual places. One great difficulty in dealing with yellow fever is that the virus remains undiscovered. Although it was believed for a considerable time that a single variety of mosquito (Aedes aegypti) was responsible for the transmission of this disease, it has now been found that there are 13 species of mosquitoes that may convey the disease. One peculiarity about the Aedes aegypti variety of mosquito is that it will travel for 400 to 1000 yards, so that it may be taken up and carried in various ways to sections remote from its breeding places. Although efforts are still being made to immunize against yellow fever, the results are varying and unsatisfactory.

ACCIDENTS IN THE HOME

About 30,000 of the total 100,000 accidental deaths have been analyzed by the Bureau of Standards and found to be largely preventable, according to statements made public by the Bureau. The particular accidents referred to are falls on stairs; injuries by mechanical devices, such as washers, wringers, fans and lawn mowers; injuries by broken glass and other trash and misplaced articles which may cause stumbling. Fires in the home add very much to the cause of accidents in dwellings. Other dangers are electrical fixtures improperly constructed, gas appliances and poisons.

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

EDITED BY RICHARD C. CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 18281

THE VALUE OF AN EXACT DIAGNOSIS

SURGICAL DEPARTMENT

PRESENTATION OF CASE

DR. DAVID W. WALLWORK*: This is the case of a fifty year old Irishman, a laundry bundle collector, who entered complaining of abdominal swelling of three months' duration.

The present illness began twelve years before entry. Ever since the onset he had had some gas, epigastric discomfort and attacks of constipation off and on. During the past five months he had had more gas and a little more pain, this time around the heart, not in the abdomen. Three months before entry his complaints became bad enough so that he went to his physician. Even at that time the abdomen was beginning to swell. Two and a half months before entry his doctor considered the situation serious enough to warrant x-ray examination. A diagnosis of ulcer was made and the patient was put on a bland diet with powders and iron. He was dissatisfied with his doctor, however, so he went to a second one, who finally sent him to a well-known clinic. The records of that clinic show no free acid in the stomach and a 4 plus guaiac in the gastric contents. Blood examination there showed a red cell count of 4,000,000, hemoglobin 70 per cent, white cell count 9,000. X-ray examination showed a filling defect in the fundus along the lesser curvature side just below the esophageal opening. The antrum also failed to fill out, suggesting pressure from outside the stomach. There was rapid emptying of the stomach. The duodenum appeared to be normal except for some irregularity on the lesser curvature side. The patient was told that he had an inoperable tumor of the stomach and was sent here for x-ray treatment.

During the past year he had lost 20 pounds in weight.

The family history is not significant except that his mother had died of cancer of the mouth.

When he came here he was a hollow-cheeked, emaciated, dry-skinned man with a tense protruding abdomen. He had walnut sized supraclavicular glands on both sides, those on the left greater than those on the right, and bean sized inguinal glands. There was moderate tachycardia. The abdomen was flat to percussion, with definite fluid wave and shifting dullness. In the Outpatient Department a mass was described to the left of the midline, but the abdomen was so distended when the patient entered the wards that no mass could be felt. There was some pitting edema of both legs.

When the patient came in here a paracentesis was done with removal of 173 ounces of clear yellow fluid. After this the spleen was very readily palpable.

We sent him to the X-ray Department with a diagnosis of cancer of the stomach and a question as to treatment. He was seen by Dr. Martin, who noted that the spleen was palpable, that the glands in the neck and the groins were enlarged and that he had lesions in both the stomach and the duodenum. At his request a biopsy of a right inguinal gland was done.

The x-rays here did not quite agree with those at the other clinic. The mass is described here as a constant deformity in the greater curvature of the stomach in the lower two-thirds. At the incisura angularis there was a peak-like projection. The antrum showed a constant irregularity and filling defect on the lesser curvature side. The duodenum appeared dilated. The duodenal loop and the lower third of the stomach showed evidence of extrinsic pressure. There was a medium amount of residue in the stomach. Peristalsis was sluggish and the peristaltic wave stopped at the incisura.

Three days later the x-ray report was the same except that a mass could be felt in the region of the antrum and the greater curvature.

Eleven days after admission the patient was discharged doing well.

Seventeen days after the second x-ray examination he was examined once more after deep x-ray therapy in the X-ray Department. The report was that there were still some filling defects in the lower third of the antrum, but not so marked as at the last examination. There was a definite deformity of the duodenal loop. The fluid in the abdomen had markedly decreased. The fluid in the chest had also decreased.

CLINICAL DISCUSSION

DR. WALLWORK: The report of the pathologist after examination of the inguinal gland was lymphoblastoma, whereas the clinical diagnosis previously had been carcinoma of the stomach with widespread metastases. The value of correcting that diagnostic impression is evident. Deep x-ray therapy affords the patient with cancer of the stomach practically no relief, but to the patient with lymphoblastoma it often affords months or even years of comparative comfort and economic usefulness.

This is a striking example of the value of establishing an exact diagnosis even in an apparently hopeless case.

DR. WILLIAM C. MARTIN: I think these two films are the most important ones. The costophrenic angle there shows a small amount of fluid. Instead of the rugae of the stomach run-

*Junior interne on the East Surgical service.

ning as they normally do, there is a definite tendency for them to be round and prominent. They are described as convolutional. This type of rugae is also seen in chronic gastritis.

We have several more films. All of them show a constant narrowing just below the cap of the duodenum, with overexpansion or overfilling of the duodenal bulb which suggested that the lesion was obstructive. The cap is much larger than is usual in a stomach that is diseased. Under the fluoroscope there was evidence of pressure along the greater curvature side of the fundus, suggesting an enlarged spleen. When we examined him outside and found the enlarged glands of course we knew he had lymphoblastoma. The finding of displacement of the fundus of the stomach however suggested an enlarged spleen, and we find an enlarged spleen so infrequently with carcinoma of the stomach that we felt sure then that he had lymphoblastoma.

In other words, he had a change in the rugae, a deformity of the antrum of the stomach and a deformity of the duodenum. We had a multiplicity of gastro-intestinal lesions and also some involvement of the chest. That was the only secret in making the diagnosis.

Dr. Edward L. Young, Jr.: I was much interested in Dr. Martin's summing up of the points by which he made the diagnosis. I do not know anything characteristic that would enable us to make the diagnosis clinically without his x-ray report.

Dr. George W. Holmes: I might add that this diagnosis of lymphoblastoma in any part of the gastro-intestinal tract seems to depend largely on having lymphoblastoma in mind when one is examining the patient. The x-ray diagnosis is made in most cases in patients in whom lymphoma is already known to exist. We have found lymphoblastoma of the gastro-intestinal tract in a number of patients known to have the disease. As far as I know this is the first case in which we made the diagnosis where the disease was not suspected until after the x-ray examination.

The findings, as Dr. Martin pointed out, are of multiple lesions in the gastro-intestinal tract which look like cancer. That should make one think of lymphoblastoma, because multiple cancerous lesions, although they do occur, are not common. From the statistical data we are able to accumulate it seems that lymphoblastoma is the most common cause of multiple lesions.

Another point is that this disease occurs in the gastro-intestinal tract with much greater frequency than most of us are inclined to believe.

Dr. Young: Are you willing to make the diagnosis in the absence of an enlarged spleen or in the absence of palpable glands in the rest of the body?

Dr. Holmes: Of course the x-ray diagnosis here is like the x-ray diagnosis in a good many other cases; we cannot make it on the x-ray findings alone. We can go so far as to state that the patient has multiple organic lesions in the gastro-intestinal tract and that lymphoma should be one of the things to be considered. In this case that occurred to Dr. Martin from the x-ray examination alone.

Clinical Diagnosis (from hospital record)

Lymphoblastoma, generalized.

Pathologic Discussion

Dr. Tracy B. Mallory: I have some sections of the lymph node examined at biopsy. The architecture of this node is completely obliterated. There are no persisting germinal centers, none of the orderly arrangement of the radial sinuses and the peripheral sinus just beneath the capsule; in fact in the next section one can see that the capsule is in places entirely destroyed. At this point we have destruction and active invasion of the surrounding fat tissue by the same type of cells that we find within the gland.

Here is a blood vessel with a perivascular lymphatic completely filled with these same cells. With a higher power one finds that these cells are somewhat larger than normal lymphocytes, with a rather irregular chromatin distribution. Mitotic figures are scattered in very large numbers throughout the tumor tissue. I should classify it as a lymphosarcoma.

This is the type of lymphoma that is most apt to involve the gastro-intestinal tract, although intestinal tract involvement may occur in any type of lymphoma, including lymphatic leukemia, but it is rare. We had this winter one case of Hodgkin's of the stomach. That is the only one I have seen. The vast majority of the cases are of the invasive sarcomatous type.

The point that Dr. Martin brought out in regard to the multiplicity of the lesions is very characteristic, especially when the small intestine is involved. Not infrequently portions of the small intestine varying from two or three inches to several feet in length may be diffusely invaded with lymphomatous tissue. I know of no other lesion that will do that.

Carcinoma as we see it here practically never invades the spleen. Dr. Warren from his material at Pondville, where much more advanced stages are frequently seen than we get in a general hospital of this sort, finds that carcinomatous metastases in the spleen are not very rare. He says that 10 or 15 per cent of cancers do show at the time of death metastases in the spleen. We have had only one case of carcinoma with splenic metastases in the last thousand autopsies at this hospital. Even when metastases do occur in the spleen in the very late stages such as Dr. Warren has described, the spleen usually is not very markedly enlarged.

Have you ever made a policy of looking as a matter of routine for gastro-intestinal lesions in Tumor Clinic cases in the lymphoma group, Dr. Holmes?

Dr. Holmes: I should say we have not made it

a general routine so far. I cannot say how many cases I have seen, but I have seen a number of patients in the lymphoma group who have shown lesions in the gastro-intestinal tract. Of course the group in which we are most interested is composed of these cases with a primary lesion in the gastro-intestinal tract.

I should add that the treatment of these cases brings up a difficult problem. If the initial dose is a little too large the viscus may rupture. We should be very careful in our treatment with radiation in these abdominal lesions. Before treating any abdominal case a careful examination of the gastro-intestinal tract should be made.

DR. MALLORY: The appearances of primary lymphoma of the stomach have been quite variable. Most characteristic perhaps is the diffuse infiltration which I judge from the changes described in the rugae that this one shows; but in a considerable number of cases deep crater-like ulcers have been present, sometimes a rather bulky tumor, so that the appearances must be very different in different cases.

Have any of these cases been followed long enough for you to have any definite idea how much radiotherapy can accomplish?

DR. HOLMES: Yes. We have had cases in which the lesion has entirely disappeared. I do not think there are any cures without surgery. We have one patient who had lymphoma of the cecum who has gone over seven years without symptoms. She had surgery followed by radiation and has had no symptoms since. The majority of cases being treated have not done well. There has been a disappearance of short duration, then a reappearance.

DR. MALLORY: A histologic diagnosis of lymphoma of the stomach is sometimes fairly difficult because the cells are apt to be undifferentiated. Occasionally I think it is quite impossible to tell the difference between an extremely undifferentiated small cell carcinoma and an undifferentiated lymphoma. There are on record several apparent cures of lymphoma of the stomach by surgery. It is difficult to know how to evaluate them. It is a question whether they are not incorrectly diagnosed. Even so it seems quite remarkable, because if they are carcinomas they must be highly malignant ones with very undifferentiated cells. Yet some of them have had cures of five years and more.

CASE 18282

RIGHT UPPER QUADRANT MASS IN A BOY OF EIGHTEEN

SURGICAL DEPARTMENT

PRESENTATION OF CASE

DR. WILLIAM H. SNYDER, JR.*: This is the case of a boy of eighteen who entered the Baker Memorial some time ago complaining of weakness and pain in the chest and right hypochondriac region. His admission diagnosis was empyema.

He had been perfectly well except for colds during the winter until two months before entry, when he had attacks of sharp pain in the right shoulder, radiating to the flank. He had a number of these attacks and was finally laid up in bed for about three weeks. At this time his doctor felt that he had pleurisy and treated him for this condition. He felt improved and went back to school for three days but was too weak to continue. He was in bed most of the time previous to entry. The pain in his right side was of a dull intermittent sort, extending diffusely from the right upper quadrant through the right side of his chest and back. He coughed occasionally but raised nothing. His appetite had been fair and he had had no nausea or vomiting. The pain was not associated with meals but came on at irregular intervals during the day and night.

At the time of entry he was running a septic temperature with a daily swing to 102°. The chest, from the physical signs, was negative except for diminished breathing over the right base. There was a large mass in the right upper quadrant, firm, smooth and extending about a handbreadth below the costal margin. This was brought out also in the x-ray.

The blood work showed 3,280,000 red cells, 60 per cent hemoglobin, 18,200 white cells. The smear showed slight achromia, slight to moderate polychromatophilia and variation in size and rare stippled cells. A Hinton test was negative. A liver function test showed 50 per cent retention. The van den Bergh and the icteric index were normal.

X-ray showed also a very small amount of fluid at the right base. A barium enema showed normal filling of the bowel but marked displacement.

The patient was about to have a complete gastro-intestinal series on the morning of exitus, when his pulse began to go up, he became pale and his blood pressure fell. It was decided that he had internal bleeding, probably into the peritoneal cavity as there was some spasm of the abdominal muscles. It was felt that an operation was unwise because of the serious nature of the underlying disease. He went into shock that afternoon and died that evening.

DR. WILLIAM C. MARTIN: The fluoroscopic examination and the interpretation of the films were made by Dr. Hampton. The films do not show anything of importance. The cecum and transverse colon show suggestive evidence of displacement downward, probably by the liver. The chest is not remarkable.

CLINICAL DIAGNOSES (FROM HOUSE RECORD)

Carcinoma of the liver?
Internal abdominal hemorrhage.

*West Surgical interne at the Baker Memorial.

ANATOMIC DIAGNOSES

Adenocarcinoma of the stomach with metastases to the liver and the retroperitoneal lymph glands.
Hemorrhage into the peritoneal cavity.

PATHOLOGIC DISCUSSION

DR. TRACY B. MALLORY: It seemed fairly evident in this case that we were dealing with malignancy. The diagnosis essentially came down to the question as to what type of malignancy would be likely to give a greatly enlarged liver in an eighteen year old boy. Actually the autopsy findings were a surprise to everyone. The primary lesion was found to be in the stomach. The liver was enlarged and filled with metastases. The tumor was grossly rather hard, white, and of slight opacity. It looked and felt like carcinoma rather than lymphoma, and in spite of his extreme youth we risked a positive diagnosis of carcinoma on the gross findings. That is confirmed by the microscopic examination.

This section is from the stomach. The mucosa is completely replaced in places by tumor. As one gets down into the submucosa and muscularis one finds typical adenocarcinoma with much mucin formation. The tumor has invaded the outer layer of the muscularis, extensive areas of the serosa, and it has gone directly through into the glands about the head of the pancreas, which were all filled with tumor. The pancreas was almost completely surrounded by tumor, but there was no tumor actually in it. So I think there is no question at all but that the primary site was the stomach.

AN INTERNE: What was the cause of death, Dr. Mallory?

DR. MALLORY: Hemorrhage into the peritoneal cavity. We could not find the bleeding point, although there were many necrotic metastases jutting into the peritoneum at many points and almost any one of them might have been responsible for the bleeding.

A SURGEON: The spleen was not enlarged, was it? There was some question at the time whether or not the spleen was felt.

DR. MALLORY: No; it was not enlarged; it showed no evidence of involvement.

We have had very few other cases of carcinoma of the stomach in people as young as this. The next youngest I remember was a patient twenty-six years old a short time ago.

DR. EARLE M. CHAPMAN: Dr. Alexander Marble* reported carcinoma of the stomach in a girl of seventeen. In a review of the literature he found that Osler and McCrae had collected 6 cases in the first and 13 cases in the second decade of life.

*Alexander Marble. Carcinoma of the stomach in a seventeen year old girl. Johns Hopkins Bulletin 48:39, 1931.

DR. MALLORY: Yes. I think the only lesson that can possibly be drawn is that cancer can occur very young, much earlier in the 'teens and twenties than we are often willing to believe.

CASE 18283

UNUSUAL CAUSE OF HEMATEMESIS

SURGICAL DEPARTMENT

PRESENTATION OF CASE

DR. ALFRED KRANES*: This is the case of a sixty-one year old native farmer who came into the hospital complaining of bleeding from the rectum for six weeks before entry.

The illness really began two years before, when suddenly one day at dinner he felt very weak and became quite pale and extremely dizzy. He felt too weak to continue with his dinner, so he went back to bed, where he stayed for three hours. Then he attempted to get up. As he did so he became very much weaker than he had been and suddenly vomited a large quantity of blood which he estimated at about a quart, and at the same time passed a large amount of bright blood by rectum. He said that also was about a quart. He became so weak that he was almost in a state of shock. He did not lose consciousness completely. His family called a doctor, who kept him in bed and gave him nothing by mouth. For the rest of that day he was very restless. The following morning he vomited a cupful of blood and passed the same amount by rectum. His doctor was called again and immediately sent him to a hospital.

The day following admission there he vomited again and also passed bright red blood by rectum for the third time, but only a small amount. He remained in the hospital a month and improved much. There was no more vomiting or passing of blood by rectum. He rapidly regained strength. A diagnosis of probable bleeding ulcer was made.

Since then he had felt very well, had had no gastro-intestinal symptoms of any kind, and did the work on his farm as usual until six weeks before entry, when on getting up one morning he again felt quite weak and dizzy and turned pale. He went back to bed again and remained there most of the day. In the afternoon he passed large amounts of blood by rectum. This time he did not vomit any blood at all. He remained in bed for four days, felt well and regained strength rapidly. By advice of his doctor he went back to the hospital for x-ray examination of the gastro-intestinal tract. A diagnosis of probable carcinoma of the stomach was made. Following that his doctor advised admission to the Massachusetts General Hospi-

*Senior interne on the West Medical service.

tal, although the patient complained of nothing, was perfectly well, did his work and had no symptoms of any kind.

There is nothing else of any importance in the past history, family history or marital history.

On admission he was a fairly well developed, rather sparse man of sixty-one who did not look at all sick. The entire physical examination was negative except for the abdomen. In the left upper quadrant near the midline was a firm round tumor the size of an orange which descended with respiration, did not seem to be fixed at all and was not tender.

The laboratory work was essentially negative. He had a red cell count of 5,000,000 on two occasions, a white cell count of 6,600. Gastric analysis showed no free hydrochloric acid. Only two out of ten stools examined showed a small amount of blood, a one-plus guaiac.

Because of the history a tentative diagnosis of leiomyoma of the stomach was made on admission.

He was sent down to the X-ray Department the following morning. I will read the x-ray report. "The first examination was unsatisfactory, as the patient had just received breakfast. There appeared to be an extremely large filling defect involving the midportion of the stomach. Request reëxamination to determine the nature of the defect. The lung fields are clear. The heart shadow is not remarkable. There are no mediastinal masses. The aorta appears normal. The chest examination is negative." Three days later the previous findings were confirmed. "There is a large tumor occupying the middle two-thirds of the stomach. The tumor has a sharp wavy outline and appears to be connected to the wall of the stomach low down on the lesser curvature. It has not the appearance of a bezoar. The tumor may be benign or malignant." A barium enema was negative and x-ray of the chest was negative.

We felt that he probably had a benign tumor of the stomach. Dr. Churchill agreed that this probably was the diagnosis. He wished him however to have a course of antiluetic treatment for a week before operation. This was given, with no appreciable change in the size of the tumor.

Operation was done twenty-one days after admission. A large tumor mass was removed from the stomach. The following day the patient was given a transfusion of 500 cubic centimeters. Later in the day his temperature went up to 104°. His pulse and respirations also rose. There were signs of a diffuse bronchopneumonic process in the chest. The abdomen however was reported soft. The third day after operation he died.

Dr. George W. Holmes: The films we have of the chest were probably taken to rule out metastasis in the chest before operation. They are negative.

We have also a series of films of the stomach, all of which show much the same thing, a large filling defect which occupies the whole midportion of the stomach but which does not destroy the outline of the stomach. The mass appears to be wholly within the stomach and does not destroy or contract its walls. The edges of the mass are fairly distinct, and it has a peculiar network-like structure. A film of the stomach nearly empty shows absence of the gastric rugae throughout the region involved.

Clinical Discussion

Dr. Holmes: Of course a diagnosis of tumor of the stomach was easy. The question whether it was benign or malignant was still unsettled. In pedunculated tumors we often see peristalsis pass over the involved areas and think that is some evidence that the tumor is benign. The absence of breaking in the wall of the stomach is also in favor of a benign lesion. In these cases a second examination is usually necessary, because collections of food or things like hair balls in the stomach might give a similar picture. One could not say what the type of tumor is, but one could say there is an intragastric tumor of a rather unusual character.

Clinical diagnoses (from hospital record)

Tumor of the stomach, benign.
Bronchopneumonia, postoperative.

Anatomic diagnoses

Neurofibroma of the stomach.
Partial gastric resection, Polya.
General peritonitis.
Septicemia, streptococcus hemolyticus.
Bronchopneumonia.
Pulmonary atelectasis, congestion and edema.
Bilateral hydrothorax.
Arteriosclerosis.
Arteriosclerotic (?) aneurysm of the aorta, small.
Chronic aortitis.
Meckel's diverticula.
Slight hyperplasia of the prostate.
Leiomyoma of the stomach, small.
Multiple adenomata (?) of the liver.

Pathologic Discussion

Dr. Tracy B. Mallory: The story in this case is very characteristic of a benign gastric tumor. A history of repeated severe hemorrhages at rather long intervals, with excellent maintenance of the general health seems to be very characteristic of a great many of these cases. Those of you who remember the illness of one of the prominent Boston doctors two or

three years ago remember that in the early four or five years the history was just about like this. These tumors are of such frequency and the possibility of cure by surgery is so great that any case of repeated unexplained gastric hemorrhage should be considered a very good suspect for benign tumor of the stomach, and possibly should be explored even in the face of completely negative x-ray evidence. Until five or six years ago the majority of these tumors were not being picked up by x-ray. Some of them still escape detection, but the majority of cases are now being found by the roentgenologist.

On the doctrine of chances myoma is very much the most probable. Among tumors of the stomach cancer is far in the lead, polyp second, myoma third. Lymphoma would perhaps come next, and then neurofibroma and lipoma as outside chances, though neither of them is very rare.

This case turned out to be not a leiomyoma but a neurofibroma, the largest one I have seen and also far and away the most characteristic one histologically. I have the specimen here. You can see what an enormous intragastric mass it was. When the specimen was cut freshly in gross it did not look like the usual leiomyoma. A leiomyoma of the stomach looks exactly like one of the uterus. You know the gross appearance of that. When it is cut we ordinarily find a very white homogeneous surface with a large number of radiating bands of fibrous lines, a very gross type of marking. In contrast a cut section of this showed an immense number of little miliary granules not very firmly adherent to each other, quite different in gross appearance from any other tumor of the stomach that I remember seeing. I had no idea what it represented in gross.

Microscopically the sections are extremely characteristic. With the low power we find a very definite arrangement to the tumor, and with a slightly higher power it becomes evident that the cells are long and spindle-shaped and that they tend to be arranged in parallel bundles with a marked palisade effect. All the nuclei run parallel and are laid on top of each other in long columns. In a few other places one gets concentric whorls of a type that almost makes one think of meningioma.

At the time of operation a very small nodule was felt in the stomach wall two or three centimeters from the main tumor mass and outside the area which Dr. Churchill felt that he wished to resect. This is a section of that little nodule. It is entirely different in appearance from the other tumor. We have here small irregularly arranged bands of muscle cells separated by very hyalin stroma. The picture is exactly similar to that of a fibroid of the uterus. On the doctrine of chances Dr. Churchill felt at the time of operation that this probably represented an entirely separate tumor, because metastasis from one part of the stomach to another very rarely occurs. So he felt it was wiser to let it alone. There have been similar cases in which the surgeon has gone back and increased his resection to take in a second small tumor, and partly as a result of that, I think, separation of the suture lines has developed and the patient has died. Minute myomata of the type of this one, two or three millimeters in diameter, are quite common. Rieniets* at the Mayo Clinic has run through two hundred successive cases looking carefully for minute nodules and has found them in 16 per cent of all stomachs. They are not so common in the stomach as in the uterus, but the stomach is probably the second commonest place in which to find them. The vast majority remain very small in size; one can just feel them only by carefully running the gastric wall between one's fingers. Consequently the great majority are of no importance. Sometimes they develop to tumors as large as we have here or even very much larger. There are a certain number of cases on record, of which this might very nearly have been one, where with a history such as this a very large tumor of the stomach was found. The assumption was made that one was dealing with an inoperable cancer and that the patient should be allowed to die without any attempt at operation. A tumor of this type, of course, can be a great deal larger than carcinoma and still be perfectly resectable. If this patient had survived operation there is no question but that there would have been a complete cure. It was a quite benign tumor, but unfortunately peritonitis developed and he died two days after operation.

AN INTERNE: What was the cause of the rectal bleeding?

DR. MALLORY: The stomach explains it perfectly. Bright red blood by rectum from stomach bleeding is not rare. I am sure a dozen of our cases have shown it. In the first instance here one had simultaneous bleeding, hematemesis and melena, from the same bleeding point.

DR. FRANKLIN G. BALCH, JR.: Does bright red blood by rectum occur without hematemesis?

DR. MALLORY: It may occur. I have seen it with lesions in the stomach, also in the duodenum. It must mean very much accelerated passage through the intestinal tract with massive hemorrhage. Diarrhea is more or less the rule with a really large hemorrhage.

*Rieniets, J. H., Frequency and pathologic aspects of gastric leiomyoma. Proc. Staff Meet. Mayo Clin. 5:364, Dec. 17, 1930.

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DIABETES AND ITS MENACE

WE appreciate the opportunity of printing in this issue the article from the Health Commissioner's office in New York City upon the importance of diabetes as a health problem and like to think that it is sent to us in recognition of Boston's interest in this disease and the efforts made to combat it in Massachusetts. Some eleven years ago one of our physicians published an article upon the prevention of diabetes emphasizing the factor of obesity in the etiology of the disease. Soon after the discovery of insulin our State Board of Health, through the help of Mr. John D. Rockefeller, Jr., promoted the general introduction of insulin by sending a bottle of insulin for emergency use to each doctor in the State, and upon a more recent occasion, the State Board of Health circularized all our physicians again upon the subject. Partly as a result of the above and the individual initiative and enthusiasm of some of our members it has come about that the mortality from diabetic coma in Massachusetts has fallen nearly to 10 per cent of the total diabetic mortality.

Diabetes is a real problem and right here in Massachusetts it ranked tenth as a cause of death in 1931. There are annually more than 1,000 deaths, in fact 1,060 in 1931. For each fatal case we must reckon fifteen living cases as the carefully prepared statistics of our State Department of Health show. Dr. Louis I. Dublin, the conservative and progressive statistician of the Metropolitan Life Insurance Company, has placed himself on record that ten years hence the problem of tuberculosis and diabetes would be of nearly equal importance.

In our issue of February 18, 1932 we commented editorially* upon a little volume entitled Diabetes: Its Control by the Individual and the State. In that this question of diabetes was discussed along broad lines and measures were described which had been recently introduced or could be appropriately inaugurated in Massachusetts to meet the ravages of this disease—ravages no less serious because they are often disguised under the form of premature old age. Dr. Bolduan's article anew emphasizes our need to meet the situation and he gives cogent reasons therefor, based upon his comprehensive study of the diabetic situation in New York City. We are glad to publish Dr. Bolduan's article. We appreciate the progressive work which has been done by the New York Academy of Medicine in appointing a commission to study diabetes, and we hope the efforts which are being made to enlarge the scope of our own diabetic endeavors here in Boston in the near future will be successful.

*See The Endowment of the Home and the Control of Diabetes.

"THE MAINSPRING OF PRIMITIVE EXISTENCE"

FOR many years it has been recognized, largely due to the work of Goltz on decerebrate animals and to Cannon's numerous experiments, that our metabolic, emotional and reproductive processes are associated in some way with the nervous system through the central ramifications of the autonomic nerves. The search for the control of the autonomic nervous system has been steadily advancing until we are now in a position to state that the area in general conforms to the hypothalamic region of the brain, an ancient structure in "a well-concealed spot, almost to be covered by a thumbnail". This region has been investigated from the anatomical point of view with great care and various groups of nuclei have been described. One of these collections of nerve cells lying within the walls of the third ventricle of the brain has been designated as the post-hypothalamic group. These nuclei appear to be the chief ganglia of the sympathetic division of the autonomic sys-

tem. The parasympathetic division is "represented" in an anterior group of hypothalamic nuclei, i.e., the tuber and supra- (or pre-) optic. The precise allocation of the parasympathetic functions is, however, not yet possible though the anterior group clearly are intimately connected anatomically with the posterior lobe of the pituitary.

New evidence has recently been brought into medical literature by the unusual and startling effects, as noted by Cushing, of the injection of surgical pituitrin or pilocarpine into the lateral ventricles*. After this procedure there appeared flushing of the face, excessive sweating, lacrimation, salivation, fall of blood pressure, increased peristalsis with vomiting, a marked fall in temperature, and a lowering of the basal metabolic rate. The effect was so rapid and pronounced that it would appear reasonable to assume direct stimulation of the nuclei lying adjacent to the ventricles. The effects were stopped by the use of atropine or by avertin anesthesia, the latter drug being one which acts predominantly on the diencephalic centers. In general, the response was one of marked stimulation of the cranial autonomic system (i.e., parasympathetic).

These, and many similar advances in the physiology of that part of the nervous system which Cushing has called "the mainspring of primitive existence", are indicated in Professor Fulton's brilliant summary of the recent work in neurophysiology found in this issue of the *New England Journal of Medicine*. The ideas expressed are to some extent revolutionary, should we compare Professor Fulton's trend of thought with that of a physiologist of only a decade or two ago. Nevertheless, much of his evidence is on a sound basis and will find its way permanently into both experimental and clinical medicine. A careful reading of his paper ought to serve as a stimulus to all physicians who practise their profession and thus have at hand clinical examples of these remarkable reflex activities which have so long been unobserved.

*Cushing, Harvey. The posterior pituitary hormone and the parasympathetic nervous system. Proc. Nat. Acad. Sci. 17:163, 239, April and May, 1931.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

BOLDUAN, CHARLES. M.D. Columbia University College of Physicians and Surgeons 1901. Director, Bureau of Health Education, New York City Department of Health. Surgeon (R.) United States Public Health Service. Lecturer, Public Health and Hygiene, Fordham University. Formerly Lecturer, Public Health and Hygiene, College of Physicians and Surgeons, Columbia University. His subject is "Diabetes an Important Health Problem." Page 49. Address: Department of Health, 139 Centre Street, New York City.

STRAUSS, MAURICE B. A.B., M.D. Johns Hopkins University School of Medicine 1928. Assistant in Medicine and Tropical Medicine, Harvard Medical School. Assistant Resident Physician, Thorndike Memorial Laboratory, Boston City Hospital. Address: Boston City Hospital, Boston. Associated with him is

CASTLE, WILLIAM B. M.D. Harvard University Medical School 1921. Associate Professor of Medicine, Harvard Medical School. Associate Physician and Assistant Director, Thorndike Memorial Laboratory, Boston City Hospital. Address: Boston City Hospital. Their subject is "The Nature of the Extrinsic Factor of the Deficiency State in Pernicious Anemia and in Related Macrocytic Anemias." Page 55.

FULTON, JOHN F. S.B., B.A., M.A., Ph.D. (Oxford) M.D. Harvard University Medical School 1927. Junior Associate, Neurological Surgery, Peter Bent Brigham Hospital 1928. Fellow, Magdalen College, Oxford 1928-1930. Sterling Professor of Physiology, Yale University 1930-. His subject is "New Horizons in Physiology and Medicine: The Hypothalamus and Visceral Mechanisms." Page 60. Address: 333 Cedar Street, New Haven, Conn.

FEEMSTER, ROY F. A.B., M.D. Johns Hopkins University School of Medicine 1924. Dr. P.H. 1925. Assistant Director, Division of Communicable Diseases, Massachusetts Department of Public Health. Address: 546 State House, Boston. Associated with him are

ANDERSON, GAYLORD W. A.B., M.D. Harvard University Medical School 1928. Director, Division of Communicable Diseases, Massachusetts Department of Public Health. Address: 546 State House, Boston. And

BURNS, ROBERT F. M.D. Baltimore Medical College 1908. Chairman, Board of Health in Fitchburg. Address: 1 Lunenburg Street, Fitchburg, Mass. And

DEWOLFE, HENRY M. C.M., M.D. Dalhousie University 1924. Epidemiologist, Division of Communicable Diseases, Massachusetts Department of Public Health. Address: 546 State House, Boston. Their subject is "The Recent Smallpox Outbreak in Fitchburg." Page 82.

MISCELLANY

NATALITY AND MORTALITY STATISTICS IN THE BIRTH REGISTRATION AREA OF THE UNITED STATES

It has been announced by the Department of Commerce that in 1930 there were 2,203,958 live births in the United States birth registration area. This

area had at that time an estimated population of 116,644,000 or 94.7 per cent of the estimated population of the United States. The birth rate, therefore, was 18.9 per 100,000 estimated population. In the same area for the same period there were 1,321,367 deaths, a death rate of 11.3.

A RADIO MESSAGE PREPARED AND SPONSORED BY THE COMMITTEE ON PUBLIC EDUCATION OF THE MASSACHUSETTS MEDICAL SOCIETY FOR THE DEPARTMENT OF PUBLIC HEALTH

APPENDICITIS*

BY HALSEY B. LODER, M.D.

There is a strong temptation in accepting the subject of appendicitis for this talk to ask for strains of intriguing faint music, attempt to cultivate the proper compelling voice of the radio announcer and present this subject to you in true modern advertising form as one of Boston's best products—even to urge you to accept the inflamed vermiform appendix as deserving of a place with the cod and the bean as symbolic of our City's contributions to the world.

All joking aside—it is a matter of no small pride with us, that it was a clear-seeing, keen-thinking Boston physician, who in the '80's proved to the world that inflammation of the appendix was a common cause of peritonitis, which once established was frequently fatal. And there is proper pride for us that this physician—Dr. Reginald Fitz, and his colleague, the master surgeon Dr. Maurice Richardson—worked together and proved that the inflammation of the appendix could be recognized before peritonitis developed, that the appendix could be removed, and that after its removal peritonitis seldom occurred. Justifiable pride when one knows that these two Boston men by their teaching are rightly to be credited with the saving of lives by the hundreds of thousands the world over.

As medical matters go, people in general have a good deal of knowledge of appendicitis. That is not strange when so many of us have had our personal, particular and somewhat private opportunity as patients to acquire information; when most of us have come into rather close contact with it at some time in our families, and when "speaking of operations" no one has escaped from lending a sympathetic ear to the recounting of the touching details of "my operation," as told by friend, neighbor, or casual stranger. However, the information that you as the laity have is so far from complete, so frequently is the little knowledge dangerous, that no apology is necessary for this attempt to increase your practical understanding.

The confusing thing to you, and I'll freely admit troublesome to the doctor, is that appendicitis is very variable in its course: On one extreme the rapid type of infection in which less than two days intervenes from the beginning of the illness before peritonitis develops, on the other extreme the mildest sort of nagging discomfort, which, however, interferes with good health and efficiency. In between these extremes exists every possible gradation of disturbance.

The medical student first studies anatomy, and so must we. In the lower right quarter of the abdomen the small intestine joins the large bowel; near this junction, coming off from the large bowel, rather like a small glove finger, is the appendix. Many thousands of years ago the human animal had a large and useful appendix, as some of our four-legged friends still have; it was as big around as the bowel itself, long, and doing real work in absorbing needed material from the food that came into it. With man's development this has had less and less to do, has consequently grown smaller, until now it is only about three inches long on the average, about as big around as a lead pencil, with the space inside of it about large enough to slip in a bone knitting needle. It still tries to do work as it did thousands of years ago; intestinal material comes into it, and is sent back out of it, but because of its small size frequently does not send material out as promptly as it should, or because of a little kinking cannot function properly. The appendix, having difficulty in emptying itself, gives the slight nagging discomforts and the train of symptoms called chronic appendicitis. This same appendix, emptying itself incompletely and therefore frequently irritated, is good soil for the infection which causes the attack of acute appendicitis. Frankly, the surgeon always finds in the acutely infected appendix ample evidence that that appendix has not been able to empty properly.

One thing of importance to you should be clear now: If an appendix is struggling day in and day out to empty itself, its struggles are hindered if it is forced to empty itself into a lazy, always behindhand bowel. This is the relation between constant constipation and appendicitis; the constipation discourages the appendix from functioning and it becomes chronic; and the chronic appendix is the one in which acute infection occurs.

It is necessary for you to understand clearly the great difference between acute appendicitis and chronic appendicitis; the conditions are so different that it is unfortunate that they do not have names so dissimilar that there could be no confusion in your minds. Acute appendicitis is truly an acute illness, in which, if the symptoms do not subside within a few hours, the safest treatment is the removal of the appendix within forty-eight hours of the true onset of the attack. Keep that in mind for future reference—there are forty-eight hours of safe time for this operation, counting the time from the true beginning of trouble. Chronic appendicitis, on the other hand, has been present for months or years before you get around to wondering what is bothering; and it is not to be treated by operation until the diagnosis is made certain by careful and sometimes extensive examinations. This is neces-

*Broadcast: April 19, 1932. Time: 4:20 P.M. Station: WBZ—Hotel Bradford.

sary in your interest. The symptoms of chronic appendicitis are stimulated by constipation, some kidney troubles, certain gall-bladder conditions, at times by gastric ulcers, some ruptures, frequently by ovarian disturbances, just to mention a few pitfalls in diagnosis. Obviously it is, shall I say, inconvenient to you as well as embarrassing to some surgeon, to have your appendix removed and then discover that you are not improved in health and comfort—perhaps faced by further operative treatment. To give you a working rule; with a proper diagnosis of acute appendicitis let your surgeon work inside the forty-eight hour limit and in chronic appendicitis insist that he exercise intelligent deliberation.

Since time counts much in the recognition of acute appendicitis it is important for you to know what to suspect; what sort of an upset should lead you to seek diagnostic help promptly. Before you are told of the early symptoms of a typical attack of acute appendicitis let me make it very clear to you that appendicitis has a most trying way of masquerading, and about half the time gives only part of the complete picture.

What may be called a normal attack of appendicitis begins with a stomachache—meaning by that a general abdominal pain; in a few hours vomiting or at least nausea; the vomiting, if it occurs, makes the patient more comfortable but the stomachache is not relieved. In from six to twelve hours the general stomachache changes to a pain in the lower part of the abdomen and soreness to pressure in the lower right quarter appears. If the family thermometer is brought into play, little fever will be present, the thermometer will register from a normal 98.6° to perhaps a 100.5°. When things have gone this far the limit of household responsibility for the diagnosis has been reached; you need a well-trained physician to take over the responsibility.

What is your best treatment when there is a suspicious upset? The rules are very definite and very simple: No food; no medicine; no activity; an enema; an icecap—and intelligent observation.

In other words, give an enema, put your patient to bed, resist that impulse to give castor oil, paregoric or any other medicine, let only water pass those lips, put an icecap over the lower right part of the abdomen, and call for help if there is any pain or soreness twenty-four hours from the very beginning of the upset.

Be suspicious of such an upset at any time from the cradle to the grave, but particularly when we are in our "teens".

And for the last word before you get the music you have patiently waited for—Don't give that castor oil!

MORTALITY RATES

Telegraphic returns from 85 cities with a total population of thirty-seven million for the week ending June 25, indicate a mortality rate of 10.1, as against a rate of 11.2 for the corresponding week of last year. The highest rate (18.2) appears for New Orleans, La., and the lowest (5.2) for Flint, Mich. The highest infant mortality rate (13.6) appears for Kansas City, Mo., and the lowest for Akron, Ohio; Dayton, Ohio; Evansville, Ind., Fort Wayne, Ind., Schenectady, N. Y., and Tacoma, Wash., which reported no infant mortality.

The annual rate for 85 cities is 12.0 for the twenty-five weeks of 1932, as against a rate of 12.9 for the corresponding period of the previous year.

CAMPAIGN AGAINST FAKE MEDICINE

The Commissioner of Health of New York City is engaged in an effort to control the sale of so-called fake medicines. It has been found that most of the alleged remedies offered by street medicine fakers are not made by the seller, but rather by manufacturing establishments. Although many of these unsound medicines are mostly water and therefore harmless, many of them are dangerous and a real menace to the health of the consumer.

The greatest danger, however, lies in the faker himself, for he makes every effort to interest his hearers in the purchase of his alleged remedies and in addition gives out "advice" which may be definitely harmful. He is too ignorant to give medical advice under any circumstances but in addition doesn't even know the real condition of the person who buys his wares and even if he attempted to allocate the drug to the condition of the person he is not competent to make a diagnosis. All he is after is the money of the gullible and often leaves a trail of misery and sickness wherever he is permitted to sell his goods.

APPOINTMENTS TO THE STAFF OF THE ROCKEFELLER INSTITUTE

The Board of Scientific Directors of the Rockefeller Institute for Medical Research announces the following appointments and promotions on the Scientific Staff to take effect on or after July 1, 1932:

New appointments:

Associate Member: Dr. Francis O. Holmes.

Associates: Dr. A. Garrard Macleod, Dr. Herbert T. Osborn.

Assistants: Dr. Joseph W. Beard, Dr. William F. Bruce, Dr. Merrill W. Chase, Dr. Herald R. Cox, Dr. George L. Fite, Mr. Roger M. Herriott, Mr. Samuel E. Kamerling, Mr. Malcolm H. Merrill, Dr. Johannes K. Moen, Mr. William C. Price, Dr. Edward S. Rogers, Dr. Jerome T. Syverton.

Fellows: Dr. Anton Schormueller, Mr. Ernest L. Spencer, Dr. Erich Traub, Dr. Philip R. White.

Promotions:

Assistant to Associate: Dr. Albert E. Casey, Dr. Robert C. Elderfield.

Fellow to Assistant: Mr. James H. Jensen.

Dr. George P. Berry has accepted appointment as Professor of Bacteriology and Head of the Department, and Associate Professor of Medicine at the Rochester Medical School, Rochester, N. Y.

Dr. Philip Levine has accepted appointment as Instructor of Pathology and Bacteriology at the University of Wisconsin, Madison, Wisconsin.

Dr. Currier McEwen has accepted appointment as Assistant Dean of New York University Medical School.

Dr. Harold J. Stewart has accepted appointment as Associate Professor of Medicine, Cornell University Medical College, and Attending Physician at the New York Hospital.

Dr. J. Lionel Alloway has accepted appointment as Assistant Professor of Bacteriology, Department of Bacteriology, Cornell University Medical College.

Dr. Macdonald Dick has accepted appointment as Instructor in Medicine, Duke University, Durham, S. C.

Dr. Filip C. Forsbeck has accepted appointment as Research Epidemiologist to the State of Michigan, Lansing, Michigan.

Dr. Ralph E. Knutti has accepted appointment as Resident Pathologist at the Strong Memorial Hospital, Rochester, N. Y.

Dr. Douglas H. Sprunt has accepted appointment as Assistant Professor of Pathology at the Medical School, Duke University, Durham, S. C.

A STUDY OF BACTERIA IN COLOMBIA JUNGLES

Under the auspices of Johns Hopkins University and the University of Pennsylvania Dr. Marvin M. Harris of the School of Hygiene and Public Health of Johns Hopkins University and Dr. William Seifriz of the University of Pennsylvania are heading an expedition to invade the jungles in Colombia, South America, this summer for the purpose of studying plant and bacteria life in that region. The funds which will support this expedition have been contributed by friends of Johns Hopkins and the University of Pennsylvania.

CLINICS VERSUS PHYSICIANS' FEES

In response to a communication in the *New York Times* the wife of a physician in that city has sought to disabuse the public with respect to the argument which has been put forth that doctors should lower their fees.

This doctor's wife very properly believes that one cause for the fees charged by physicians is the diminution of private practice by reason of competition of clinics. She sets forth that when clinics were first organized they were for the purpose of giving aid to the poor and needy who could not pay even a small fee to the physician, but she alleges that the clinics are now shamefully abused and seem to have been developed so as to be available for everyone who may choose to take advantage of them.

According to her statement all of the clinics in New York City are overcrowded with people trying to get something for which they, practically speaking, have to give nothing. She tells a definite story of a young man who employed a physician to perform an operation on his child and afterwards felt concerned because he found that he could get the same work done in a clinic for a very small fee. This doctor's wife alleges that physicians are slowly losing their patients and are left to resort to various kinds of work in order to eke out an income.

The remedy proposed is that, if the clinics could be closed to all but the really poor, the people would seek aid from physicians, and the physicians could afford to charge a small fee because of the increase in their practices. This reference is wholly to clinics operated by the city.

ALCOHOLISM AS A CAUSE OF DEATH

Although it has been found that alcoholism is a potent factor in the increase of mental disturbances especially in the young, the death rate from this drug in the United States dropped from 3.7 to 3.5 per 100,000 between 1929 and 1930, according to figures compiled by the Bureau of Census, Department of Commerce. The mortality rate from cirrhosis of the liver which is frequently attributed to the influence of alcohol remained the same as in 1929. These statistics are based on data from all states except Texas and the District of Columbia. So far as deaths are concerned in a general way alcoholism took a toll of 4,158 lives in 1930 compared with 4,339 in 1929, while cirrhosis of the liver accounted for 8,583 deaths two years ago and 8,377 in the preceding year. The highest death rate from alcoholism since 1910 was 5.9 per 100,000 in 1913 while the lowest was 1 in 1920. Cirrhosis of the liver killed 14 persons in every 100,000 in 1914 while the lowest ever recorded was 7.1 in 1920. The highest death rate from cirrhosis of the liver was reported as 10.7 in California in 1930 and the lowest rate was 3.1 registered by Utah and North Carolina.

It may be that the statistics with reference to cirrhosis of the liver will be modified by further studies by Dr. Frank B. Mallory, who took as his subject for the last Shattuck Lecture "Cirrhosis of the Liver."

THE ECONOMIC PROBLEMS BEFORE HOSPITALS

It has become recognized that present financial conditions throughout the United States are working badly for many of the large and important hospitals. For example, St. Luke's Hospital in New York is now obliged to conduct a campaign for $150,000 because of a deficit for the first time in 74 years. The income of this hospital has been reduced sharply by reason of the decline of dividends from investments. The cost of caring for patients has not diminished in proportion. Under present conditions the charity service constitutes about 76% of all treatment given at this hospital. In the first three months of this year alone, receipts from paying patients declined $23,031.69. In addition to the immediate financial difficulty this hospital is unable to carry on its project for enlargements which have been under consideration for some time.

Unfortunately this illustration is only one of many which apply to hospitals throughout the country. It is especially noticeable that private hospitals are in very difficult straits at the present time because of the inability of well-to-do people to take advantage of their facilities and also because of rising costs of medical service.

THE PERSISTENCE OF DIPHTHERIA CARRIERS

German clinicians have emphasized the difficulties of completely eliminating diphtheria bacilli from carriers because, existing as they do in the throat or nose, they cannot be killed with certainty and while such carriers are speaking, coughing or sneezing the bacilli may easily be scattered and become the source of contagion. Professor Husler in the *Münchener medizinische Wochenschrift* says that countless attempts have been made to free diphtheria carriers of bacilli. As a rule all such attempts fail and the usual efforts by means of gargles and sprays are ineffective.

ALCOHOL AND MENTAL DISEASES

According to the *Mental Hygiene Bulletin*, an article by Frederick W. Brown, director of the Department of Statistics of the National Committee for Mental Hygiene, sets forth that mental disease due to alcoholism increased more than 36% between 1923 and 1930 while alcoholism without mental disease nearly quadrupled between 1926 and 1930. The trend among alcoholics before and after the enactment of prohibitive legislation indicates that the problem is increasing in magnitude and consequently in seriousness. During the first part of the present era the use of intoxicating liquor was restricted to a certain degree, but since then there seems to have been a definite increase, for the general proportion of alcoholic mental diseases jumped from 1.9 to 2.6 in 1930. These results are based on an analysis of figures from the Census Bureau of the New York State Department of Mental Hygiene and reports from superintendents of state hospitals for mental disease. A new type of mental disease due to alcoholism has been observed, the symptoms of which manifest themselves through a form of destruction of organic and nervous tissue. The extreme cases show violent mental disturbances in a short time without the return of the normal mental state. The increases are largely among very young people of high school age.

MATERNITY PROTECTION OF WORKING WOMEN*

Laws have been enacted by 48 foreign nations and by only 6 states in the Union relating to the protection of working women in connection with the functions of maternity. In 37 countries provision is made for payments to mothers for medical services either through public funds, insurance or employers. In the United States no provision is made for necessary expenses incurred because of maternity. In 26 countries the laws apply to women in both industry and commerce. In several of these states there are two laws, one applying to industry and one to commerce; in 18 to women in industry; in 2 to women in commerce; and in 2 to women workers in general. In the United States, as stated above, only 6 of the 48 states have laws to regulate the employment of women before and after childbirth, namely Connecticut, Massachusetts, Missouri, New York, Vermont and Washington. In only one case is the period during which women must not be employed either before or after childbirth as long as a six weeks' period.

In Massachusetts and Vermont the period during which women shall not be required to work is two weeks before and four weeks after childbirth; in Missouri three weeks before and three weeks after; in Connecticut four weeks before and four weeks after; in New York four weeks after; in Washington four months before and six weeks after.

In none of the six states is provision made for payment of wages to women during this period.

*Facts set forth in the *United States Daily*, June 18, 1932.

CORRESPONDENCE

A TRIBUTE TO DR. CHARLES S. HOLDEN

The Commonwealth of Massachusetts
Department of Public Health
State House, Boston

July 6, 1932.

Editor, *New England Journal of Medicine*,

Through the death of Dr. Charles S. Holden of Attleboro the public health of the Commonwealth has lost a devoted friend and advocate. As a member of the Public Health Committee of the Legislature, and lately its House Chairman, I found him a sincere, untiring, devoted friend of everything which would advance the public health. He was always on the side of right and fought valiantly for it. He always gave generously of his time, and particularly now we can ill spare men of his quality.

Yours truly,

GEORGE H. BIGELOW, M.D.,
Commissioner of Public Health.

RECENT DEATHS

DAVIDSON—PERCY BERNARD DAVIDSON, A.B., M.D., the son of Dr. and Mrs. Kallmer M. Davidson, was born in Boston in 1895. His academic degree was conferred at Harvard University in 1916, and his medical degree by Johns Hopkins Medical School in 1920. After graduation Dr. Davidson became interested in internal medicine and studied the various basic subjects under competent teachers. His courses at Hopkins, Mayo's, the University of Wisconsin and the University of Chicago led him into the realms of gastrointestinal work. An appointment to the Thorndike Memorial Laboratory in 1922

gave Dr. Davidson the opportunity to do much research work in his chosen field and many publications of note resulted. In 1924 he was appointed Resident Physician at the Thorndike Memorial Hospital; in 1926, by vote of the Trustees of the Boston City Hospital, he was appointed Junior Visiting Physician. Greater opportunities now presented themselves for a practical application of his years of research and for clinical instruction to the students. The Boston Dispensary and the Beth Israel Hospital recognized his ability and appointed him Gastroenterologist on their respective staffs. He spent the year 1931 as Research Fellow at the Thorndike Memorial Laboratory.

On April 15, 1932, the Trustees approved of the vote of the Senior Staff making Dr. Davidson head of the gastrointestinal clinic. It is sad to record that just two weeks later Dr. Davidson died at the Thorndike Memorial Hospital following an operation for an acute abdominal condition.

Dr. Davidson had a pleasing personality and was courteous, kind and scholarly. While he had many friends, he had few intimates; he preferred his books to social intercourse. He was an educator, a scientist, and a physician, and will be greatly missed by his associates and friends.

Dr. Davidson is survived by his widow and by his father.

P. F. Butler,
Secretary Senior Staff,
The Boston City Hospital.

July 7, 1932.

CORRECTION

The office of President and Vice-President as published in the Recent Death Notice of Dr. Frank A. Hubbard published June 30 on page 1378 should have referred to his services in the Bristol North District Medical Society.

NOTICE

REMOVAL

Dr. Claude E. Forkner announces his removal from the Thorndike Memorial Laboratory, Boston City Hospital, Boston, Mass., to Peiping Union Medical College, Peiping, China.

SOCIETY MEETINGS
CONGRESSES AND CONFERENCES

July 10 - August 12—The Second Intensive European Summer Course in Surgery, Gynecology and Obstetrics. See page 714, issue of March 31.

September 19-22 — International Congress of Biliary Lithiasis. See notice on page 427, issue of February 25.

October 17-21—Clinical Congress of the American College of Surgeons. See page 1330, issue of June 23.

October 17-28—The 1932 Graduate Fortnight of the New York Academy of Medicine. See page 1375, issue of June 30.

October 22-24—Health Education Institute. See notice on page 47, issue of July 7.

October 24-27 — American Public Health Association. See notice on page 1321, issue of December 31, 1931.

October 24-28—Inter-state Postgraduate Medical Association of North America. See page 39, issue of January 7.

BOOK REVIEWS

Pulmonary Tuberculosis. By Maurice Fishberg, M.D. Published by Lea & Febiger, Philadelphia. Price $15.00.

This fourth edition of Dr. Fishberg's Pulmonary Tuberculosis appears in two volumes, each of approximately 600 pages. As he states in his preface, he has endeavored to depict the advances of the past ten years in the knowledge, pathogenesis, diagnosis, prophylaxis and treatment of pulmonary tuberculosis. This work might almost be described as monumental. It contains so much information that it would be an almost overwhelming task for any busy practitioner to sit down and attempt to read and digest it from cover to cover. It is primarily a book of reference and the references to the literature on the subject found at the bottom of each page are convenient and clearly arranged. The numerous plates and diagrams are of the best, the paper, printing and technique could hardly be improved upon.

In this work Dr. Fishberg has given new chapters of the greatest value and importance, among which subjects are included the orothrocyte sedimentation test, B.C.G. in prophylaxis, heliotherapy in pulmonary, intestinal and laryngeal tuberculosis, syphilis, asthma and hay fever in the tuberculous, the Gerson salt-free diet and the medical phases of the operative treatment of pulmonary tuberculosis. There are over 100 new illustrations. Dr. Fishberg is convinced as a result of his long experience with the tuberculosis problem in New York City that the physician should do more than merely recognize the disease in its earliest stages and consign the patient to a sanatorium or other resort. He is impressed by the fact that early tuberculosis does not necessarily mean curable tuberculosis and that advanced disease does not necessarily indicate a hopeless outlook and especially that the sanatorium and climatic treatment are not the only methods of handling tuberculous patients effectively. He believes that careful home treatment is as productive of immediate results and is as good as institutional treatment, less costly to the patient and to the community. This is the only statement that the reviewer has found in his book with which not only he but the majority of workers in this field would disagree. It is undoubtedly the consensus of opinion that treatment in a sanatorium or its equivalent for a while at least should be looked upon as an essential and integral part of the treatment of this disease and that no amount of home treatment, no matter how carefully regulated and supervised, would give the patient the training and proper mental attitude toward the disease which he would get in a well-run sanatorium or resort.

Dr. Fishberg goes on to make the distinction, so much needed, between tuberculous infection and tuberculous disease. In discussing the clinical aspects of tuberculosis he elaborates the importance of the constitutional signs and symptoms on which

the physician must base his decision as to whether the patient is ill and in need of treatment. With the exception of Dr. Fishberg's evidently strongly-fixed opinion that home treatment is equal to and a little better than sanatorium treatment one notes with pleasure in this edition the absence of some of the various categorical and arbitrary statements concerning many much-discussed points which were present in the early editions of his book. With the passage of years Dr. Fishberg evidently has acquired a more kindly and liberal feeling toward the opinions of others competent to speak on this subject. An example of the type of statement so often found in the early editions of this book, for instance, is given in the last paragraph of his preface, "Everything else being equal, it makes very little difference whether patients remain at home or go to some climatic resort." He does not mention, for instance, the problem of the danger to children which cannot possibly be avoided, no matter how strict precautions are taken when the patient with active tuberculosis remains at home with his family. In commenting on this attitude of Dr. Fishberg, one might quote the law on the statute books and enforced in the city of Chicago,—that no person with active tuberculosis and a positive sputum can remain at home where there are children of sixteen years of age or under. Either the children must be separated from the patient or the patient from the children. This may be looked upon as an extreme attitude to take but most of us who feel that a large part of the solution of our tuberculosis problem depends upon doing away with childhood infection and the "contact" case, will sympathize with the Chicago attitude on this subject rather than with that of Dr. Fishberg.

In his first volume Dr. Fishberg discusses the epidemiology of the tubercle bacillus, tuberculous infection, predisposition, the phenomena of immunity, pathology and morbid anatomy, symptomatology (to which he devotes seven chapters), physical examination of the patient, divided into inspection and palpation, percussion, auscultation and the roentgenology of pulmonary tuberculosis, and finally, there are six chapters devoted to the clinical forms of phthisis. It is quite impossible to review each of these chapters in detail. There are one or two points to be mentioned. One would gather from the figures he presents, for instance, that the incidence of tuberculous infection in children up to 16 years is up to 70-80% or approximately as high as it was twenty to twenty-five years ago. The figures in Massachusetts based on the ten-year program of examining children of school age would indicate that the incidence of tuberculous infection in children is not over 30%.

In the second volume he presents a most interesting chapter to pulmonary tuberculosis in children and in contrast to this takes up the subject of phthisis in the aged, a most important but neglected point. He then considers tuberculosis of the pleura. He devotes a chapter to spontaneous tuberculous pneumothorax and likewise takes up the differential diagnosis and complications of phthisis. He discusses at length pulmonary tuberculosis with reference to certain physiological and pathological processes such as pregnancy, growth, puberty, etc., as well as its occurrence in syphilis and endocrine disorders. After discussing prognosis and medical, legal and insurance aspects of tuberculosis he devotes the remaining sixteen chapters to treatment with particular reference to the treatment of symptoms and the various means of collapse therapy.

On the whole one might well look upon this work of Dr. Fishberg's as one of the best if not the very best presentation of the subject of tuberculosis in all its phases in the literature. It is a pleasure to have it in one's library. Although one cannot agree with everything that he says, one certainly will get stimulation and information at all times from it.

In Volume II of his work Dr. Fishberg, in discussing the proportion of cases suitable for therapeutic pneumothorax, makes the following statement: "Men who are competent to speak authoritatively find that less than 5 per cent of all cases of pulmonary tuberculosis . . . can be considered ideal for pneumothorax treatment. In my experience . . . I have found less than 5 per cent." During the past year the reviewer asked the opinion of from thirty-five to forty leading authorities in tuberculosis work in this country this very question. These included the Saranac, Asheville, Liberty and Colorado Springs group and the leading specialists in California, Oregon, New York, Chicago and elsewhere. It was the consensus of opinion that from thirty to forty per cent of all cases of active tuberculosis should at least be given a chance at some time in their course of treatment to receive the benefits of some form of collapse or compression therapy, especially artificial pneumothorax. Dr. H. D. Chadwick, formerly of Massachusetts, now of Detroit, Michigan, with 1500 patients under his supervision in three sanatoria, has 57 per cent under some form of compression therapy. The Rutland State Sanatorium percentage is around 30 per cent; at Wallingford, Connecticut, under Dr. David Lyman, and in New Haven, Connecticut, under Dr. Willard Soper, the figures run from fifty to sixty per cent. Other figures of a similar nature could easily be given. In this respect the reviewer would absolutely differ from Dr. Fishberg and is firmly of the opinion that the vast majority of clinicians in this country would support him in his stand that Dr. Fishberg's figure is altogether too low and that there are countless patients who are dying and continuing as invalids simply and solely because the percentage of cases in which this form of treatment is used is still deplorably low.

Varicose Veins. By H. O. McPheeters. Third Edition. Published by F. A. Davis Co. Price $4.00.

The text follows in general that of the previous editions, giving a concise yet thorough description

of varicose veins and their treatment, based on the author's experience in treating two thousand cases. He has clarified the subject, amplifying and revising his earlier book with added illustrations, new experimental data, and summarized tables.

It is preëminently practical throughout in its careful description of details of technique, and would amply serve by itself as an instruction manual for the treatment of varicose veins and their complications regardless of the reader's previous experience.

The multiple injection method and the choice of glucose for the agent used is expressed with even more conviction than before, although a conscientious effort is made to fairly evaluate the other solutions and methods. Fundamental considerations are so ably stressed that the reader is firmly convinced that a violation of these will spell disaster regardless of what method or agent is used. The ambulatory treatment of varicose ulcers is ably dealt with, and the text dealing with the microscopic study of treated veins is again the work of Dr. Nathaniel Lufkin.

The addition of a chapter on the causes of failure of treatment is of special interest. It is unfortunate that the author's statistics of the end results of his treatment could not have been included to substantiate the enthusiasm that is expressed throughout.

The Surgical Clinics of North America. Lahey Clinic Number. June, 1932. Volume 12, Number 3. Philadelphia, W. B. Saunders Company.

Lahey starts this issue with a valuable discussion of the management of biliary tract disease. He urges earlier operation and accordingly earlier diagnosis for which he recommends the more frequent use of the intravenous Graham test and of duodenal drainage. If a case of acute cholecystitis demands an operation he does a cholecystostomy followed after two months by a cholecystectomy. He again emphasizes the value of exploration of the common duct even in the absence of definite symptoms of stones.

In Clute's discussion of obstructive jaundice he states that he has found the sedimentation rate the most valuable index of the hemorrhagic tendency. If the cells settle more than 30 mm. in thirty minutes, hemorrhage is likely. For the treatment of this condition he recommends whole blood transfusions. Two-stage operations are often done, the first stage consisting in drainage of the common duct. He also discusses stricture of the common duct.

Overholt reports an interesting case of subdiaphragmatic abscess following cholecystectomy. This extended into the lung causing a chronic lung abscess that was eventually cured following phrenic exeresis.

Sise outlines the use of preoperative narcosis. The most common procedure is a combination of morphine, scopolamine, and a barbiturate. For regional anesthesia the preference is for avertin or a barbiturate. He also discusses the control of blood pressure in spinal anesthesia. The drop is probably not a matter of simple splanchnic vasodilation. He uses small doses of ephedrine as a prophylactic and epinephrine as a circulatory stimulant during anesthesia. He considers that postoperative pulmonary complications are less frequent with spinal than with ether anesthesia.

Woodbridge explains the value of the carbon dioxide absorption method of gas anesthesia. After induction, merely enough anesthetic gas to wash out the carbon dioxide is required.

Kiefer reports five cases illustrative of the various types of gastro-jejunal ulcer and emphasizes the diagnostic features.

Hoover gives an excellent discussion of dysphagia accompanied by a presentation of ten cases demonstrating pathology of the esophagus. He also reports some excellent results in the relief of certain severe headaches by treatment of the sphenopalatine ganglion as recommended by Sluder.

Hicks points out that some kidney infections especially infected hydronephroses and perirenal inflammations may give rise to general symptoms without localizing symptoms or signs.

Haggart demonstrates the treatment of severe contracture of calf muscles and also the method of fascia lata repair of fracture of the patella as originally described by Allen. He also gives a concise review of the present status of chronic arthritis.

The group of articles concerning the thyroid that emanate from the Lahey Clinic are always of interest. In this issue are discussions of carcinoma of the thyroid, position of the trachea following operative removal of substernal goiter, delayed ossification in hypothyroidism, choking as a symptom of goiter, and operative injury to the recurrent laryngeal nerve.

A Text-Book on X-ray Therapeutics. By Robert Knox, M.D. Completed and Edited by Walter M. Levitt, M.D. New York and London, The Macmillan Company. 250 pages. Price $7.00.

At the time of his death Dr. Knox was engaged in the preparation of a new edition of his textbook on radiation therapy. This edition was intended to be an enlarged volume dealing with all branches of radiation therapy. The section on x-ray therapy was in a fairly advanced stage of preparation, but was not complete, and it is this portion of Dr. Knox's work which has been revised and edited by Dr. Levitt.

The book is intended as a textbook on x-ray therapeutics. It contains 250 pages, and is divided into ten chapters. The subjects discussed are as follows: the effect of x-ray on tissues; the physics of x-ray therapy; x-ray measurements and dosage; the use of filters in x-ray therapy; with a description of the tubes and various types of high tension generators; the principles on which x-ray technique is based.

These subjects take about half of the text, the remaining half being devoted to a discussion of the various diseases in which the x-ray is of use as a therapeutic measure.

As a textbook for students the volume can be highly recommended, particularly the chapters on physics and technique. The apparatus described is not that generally used in this country, and the discussion on the use of the x-ray in the treatment of diseases is rather brief. The addition of statistical data and case reports would, in the reviewer's opinion, increase the value of the book considerably.

A paper presented by Dr. Knox at the Second International Congress of Radiology on "The Biological Factor as a Guide to Dosage and Its Influence upon the Development of Technique" is included in an appendix, also the "Recommendations for X-ray and Radium Protection as They Relate to X-ray Therapy" established by the International Congress. There is a complete and well-arranged bibliography.

Clio Medica. Edited by E. B. KRUMBHAAR. *VII—Medicine Among the American Indians.* By ERIC STONE, Providence, R. I. With 17 illustrations. Paul B. Hoeber, Inc., New York, MCMXXXII, pp. 139. Price $1.50.

The editor of this small volume on the Medicine of the American Indians states that: "It is one of a series of handbooks, which under the title of 'Clio Medica,' aims at presenting in a concise and readable form a number of special phases of the long and complex history that underlies the great edifice of modern medical science."

Dr. Stone has written a most interesting and instructive account of American Indian Medicine, the illustrations adding much to the value of the text. Some of these show the crude scalpels, scarifiers, and needles used in Indian surgery. There is also a reproduction of the author's painting of a medical ceremony of the Navajos.

It is interesting to note in Chapter 4 (Morbidity) that: "Neoplasms are not known to have occurred among the early Indians. The physicians who deal with the modern Indians state that, even allowing for difficulties of diagnosis, malignancy in pure Amerind strains is a great rarity."

It is noted in Chapter 6, on Surgery and Obstetrics, that: "The full blooded Indian baby is relatively much smaller than the white or half breed baby." The author states that this is so well known that in many tribes pregnancy is terminated at the second or third month if a white is believed to be the father.

Much rheumatism and neuralgia prevailed among the Indians on account of their constant exposure to the elements, and sweat baths were very commonly employed for the relief of these and other conditions.

"Wounds were dressed frequently and were kept scrupulously clean," and we are told that many tribes were accustomed to suture large wounds with sinew, using bone needles; also most tribes understood the value of the cautery in arresting hemorrhage.

They surpassed in the treatment of fractures and dislocations, and in the Great Lakes Region incised and drained for empyema.

As regards susceptibility to infections, Dr. Stone tells us that it was not even necessary for the Indians to come in contact with sick or ailing whites. The mere presence of whites in virgin Indian territory caused sickness and often death to the Indians.

It is quite impossible to touch on all the points of interest in Dr. Stone's book; that it will prove a fascinating study for physicians is certain.

Diseases of the Coronary Arteries (Myocarditis). By DON C. SUTTON and HAROLD LUETH. C. V. Mosby Co. Price $5.00.

Because of the increasing interest in heart disease and especially in disease of the coronary arteries, this volume is quite timely. It includes in 150 pages a fairly complete discussion of angina pectoris, coronary thrombosis, and heart muscle disease in general. It is simply divided into the following chapters: Symptomatology, physical examination, anatomy, pathology, physiology and pharmacology, and finally, treatment.

The discussion throughout is clear and simple, and the authors have done well in referring to most of the important contributions in the medical literature to support their statements. As a result of this a very satisfactory bibliography was added at the end of the book. There is a small but well diversified number of illustrations showing the significant changes in gross and microscopical pathology, physiology, electrocardiography, and roentgenography, that pertain to the different topics discussed.

The book is not too long and is easily read. It can be recommended most highly and the authors, who were responsible for some brilliant animal experiments on pain in relation to ischaemia of the heart, are to be congratulated.

Text-Book of Massage and Remedial Gymnastics. By LOUISA L. DESPARD. With two chapters contributed by Hester S. Angove. Oxford University Press. Third Edition. 1932. 474 pp. Price $6.00.

This volume is presented as a textbook and book of reference for students of massage. The intelligent use of massage requires a basic knowledge of anatomy and physiology; and of the bodily mechanics of the various deformities, dysfunctions, and diseases. With this in mind, the author devotes almost half of the book (Part I, 220 pp.) to the fundamentals of anatomy, which are well supplemented by numerous illustrations in colors some of which are taken from Cunningham.

Part II begins with a discussion of the influence

of massage on the various systems of the body, and a description and classification of the various massage movements.

Then follow two chapters devoted to the Swedish system of remedial gymnastics. The first of these describes the fundamental positions and the derivations therefrom.

The second gives a set of tables describing each exercise, its therapeutic uses, and the muscles and joints involved. The apparatus required is simple; consisting of a high and low plinth, rib stool, boom, and hanging bars. Most of the exercises, however, require the assistance of a gymnast. It would be a distinct advantage if these sections could be supplemented by more illustrations of the standard positions and derivations, and possibly also some diagrams of the various movements. The illustrations which are provided are good.

Chapters VI to XVI give a description of almost every type of deformity, injury, or disease in which massage or Swedish remedial gymnastics might be indicated.

This part of the book should prove extremely valuable both as a ready reference for the masseur and gymnast, and also as a means of acquainting the physician with the possibilities in conditions which ordinarily might not occur to him as being suitable for these forms of treatment.

The two chapters by Miss Angove on the use of massage and remedial exercise in cardiac and respiratory tract diseases are of considerable interest.

Chapter XVII describes electrical methods in conjunction with massage. This chapter gives the elementary principles of medical electricity and methods of application as applied in the galvanic, faradic, and diathermic currents. The use of the sinusoidal currents as an adjuvant to or substitute for massage is not discussed.

The volume closes with diagrams of the motor points of the various muscles, and a very complete index.

As the author correctly states in her preface, a good masseur cannot be trained by reading a book. Personal instruction under an experienced teacher is essential. As a textbook and reference book for masseurs, this volume admirably fulfills its purpose.

Manual of Bacteriology. By ROBERT MUIR and the late JAMES RITCHIE, 9th Edition revised by C. H. Browning and T. H. Mackie. Humphrey Milford, Oxford University Press. Price $4.75.

Muir and Ritchie's Text-Book of Bacteriology has been revised by Browning and Mackie, and this ninth edition has been brought well up to date. This medical student's textbook has always been in the front rank and the present edition on the whole keeps up this standard very well. It perhaps hardly does justice to the studies of the last ten years on bacterial variation and the insight this work has given us into the morphological, biological and immune-chemical characteristics of pathogenic bacteria. It would be an exaggeration to say that these investigations have revolutionized the whole subject of bacteriology, but they have in very many cases brought order out of chaos, and almost every organism is being reinvestigated in the light of this new knowledge. If it adds something to the tribulations of the medical student, it is indispensable to his understanding of both infection and resistance.

On reading a textbook such as this, one cannot help being struck by the emphasis that is still laid on the descriptive side of the subject. This is hardly the fault of the authors, because medical bacteriology is still mainly in the phase of describing phenomena, and we have yet little real understanding of the sequence of events following on the invasion of the host by the parasite. For example, the phagocytosis of pathogenic bacteria by the cells of the host is the most fundamental mechanism in immunity, yet our knowledge of this mechanism is confused and inexact, and it is certainly not clarified in the book under review.

Despite these criticisms—and the latter criticism is rather of the subject than of the manual, for the authors are frank enough about our ignorance—the present edition of this textbook well maintains its position among the few first class student's textbooks in the English language.

Growth in Private School Children. By HORACE GRAY and J. G. AYRES. University of Chicago Press, 1931. Price $3.50.

This volume is one of the Behavior Research Fund Monographs and presents the average and variables based on about 3000 measurements on boys and 1500 on girls, from the ages of 1 to 19. The figures are, of course, of great value to the anthropologist and statistician. The subject matter is treated from the point of view of a definition of the term normal from the point of view of sex, of age, race, and of region. A discussion of mental tests is also provided and two chapters are devoted to the interpretation of measurements on a given child.

It is obvious that this monograph represents extremely valuable data for the specialist in this field.

Notes on Children's Nursing. By MARGUERITE C. ERXLEBEN, R.N., B.S. 235 pages. 43 illustrations. F. A. Davis Company. 1931. Price $2.00.

The book is intended for students in Schools of Nursing. Part I is devoted to the general routine duties, Part II, preparation of food, Part III, procedures and treatments. In each instance the object of the procedure is given, the necessary equipment, and the method followed. The directions are clear and detailed, and the text is illumined by the use of good illustrations. The social and mental needs of the child are emphasized as well as the physical. It should prove of interest for comparative purposes as the routine which is followed at the Children's Hospital in Philadelphia is given in detail.